PRESCRIBED

FIRE MANAGEMENT

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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Attachment 1-1

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Chapter 1: Introduction

A. Purpose

The purpose of this Instruction Memorandum is to provide direction on how to implement prescribed fire in a safe, cost-effective manner to achieve resource management objectives as they are defined in land use plans (LUPs) and Fire Management Plans (FMPs). This IM provides specific direction in the areas of Prescribed Fire Plan content, complexity rating, qualifications, the use of 2823 funds, escaped prescribed fires, and prescribed fire reporting. For a visual overview, see the video BLM Prescribed Fire distributed through Information Bulletin OF&A 98-023, dated March 23, 1998.

Fire is an essential ecological process in many ecosystems. Prescribed fire is used to alter, maintain or restore vegetative communities, achieve desired resource conditions, and to protect life, property, and values that would be degraded by wildland fire. Prescribed fire is only accomplished through management ignition and is supported by Bureau planning documents and the appropriate environmental analysis, and is implemented in accordance with Bureau Manual sections 9214 and 9211.

B. Program Goals, Priorities and Guiding Principles

Program goal: The Bureau of Land Management (BLM) will develop and implement a prescribed fire and fuels treatment program that supports the *Federal Wildland Fire Management Policy and Program Review* (12/18/95), that promotes the safety of firefighters and the public, and meets land management objectives.

Priorities: To reduce hazardous fuels and to restore fire to its natural role through the application of fuels treatments which may include prescribed fire and mechanical and chemical treatments. The Bureau will strategically focus activities by placing priority on:

$ Areas where actions will mitigate threats to the safety of employees and the public.
$ Areas where actions will protect, enhance, restore and/or maintain plant communities and habitats that are critical for endangered, threatened, or sensitive plant and animal species.
$ Areas that will reduce risks and damage from wildfire. This includes the reintroduction of fire into fire-dependent ecosystems to maintain and enhance those ecosystems and the modification of vegetation to achieve specific land management objectives.

Guiding Principles: The following guiding principles are fundamental to the success of the Bureau=s Prescribed Fire and Fuels Management Program.

$ **Firefighter and public safety is the first priority in every fire management activity.**
$ Only qualified personnel using safe working standards and guides will participate in the implementation of prescribed fire and fuels treatment projects.
$ Recruit and retain a well-trained, diverse workforce that meets the highest standards of professional and technical expertise.
$ The role of wildland fire as an essential ecological process and natural change agent will be incorporated into the land use planning process and the fire management program.

$ Fire program managers will work with Agency Administrators, resource specialists and cooperators to identify treatment areas, develop plans, and implement fuels treatments.
$ Ensure that the fuels management program is in compliance with applicable national, state, and local laws and regulations, and Departmental and BLM manuals, policy and direction.
$ Reduce fire suppression cost and environmental damage.
$ Promote cooperative landscape scale projects to increase effectiveness and efficiency.
$ Develop education plans and marketing strategies with internal and external audiences to increase awareness of, and the need for, prescribed fire and other fuels treatments.
$ Encourage research, monitoring and program development to advance the understanding of fire science.

C. Management Responsibilities

Existing delegations (910 DM 1.2) from the Secretary of the Interior to the Director of the Bureau of Land Management provide for the operation of the fire management program, including prescribed fire.

1. The BLM Director is responsible for developing policy guidance for the use of prescribed fire.

2. The Director, Office of Fire and Aviation, is responsible for overall policy and guidance for prescribed fire management activities. These responsibilities include:

a. Establishing prescribed fire planning and fiscal guidance.

b. Establishing prescribed fire operational guidance.

c. Establishing prescribed fire personnel qualifications.

d. Establishing prescribed fire reporting procedures.

e. Establishing prescribed fire review criteria and procedures.

f. Establishing prescribed fire effects monitoring guidelines.

g. Providing assistance to the states, including smoke management, fire effects, equipment development, planning and implementation.

h. Participating in national level smoke management and air quality programs.

i. Reviewing and/or investigating escaped prescribed fires.

3. The Assistant Director for Renewable Resources and Planning is responsible for establishing resource planning, NEPA compliance and resource monitoring standards for prescribed fire activities.

4. State Directors are responsible for developing, implementing, and evaluating prescribed fire operations. Each State Director will:

a. Develop additional guidelines as needed for the planning, implementation, monitoring, reporting, and evaluation of prescribed fire activities.

b. Approve Prescribed Fire Plans. Authority may be delegated to the Agency Administrators (not specific offices) as provided under BLM Manual Section 9211.32 and identified in BLM Manual Section 1203.

c. Review/investigate escaped prescribed fires.

d. Incorporate prescribed fire into geographic and local area preparedness plans.

e. Ensure participation in state level smoke management programs.

f. Perform periodic program review to assure compliance with national and state standards.

g. Ensure that only trained and qualified personnel participate in the implementation portion of the prescribed fire program.

5. Agency Administrators will:

For the purpose of this document, the Agency Administrator is defined as the District Manager, Resource Area Manager, Field Office Manager, Field Manager, Center Manager or other line manager directly responsible to the State Director.

a. Make the decision to use prescribed fire, and incorporate prescribed fire into the BLM=s planning framework (RMPs, FMPs and amendments) and related NEPA documents.

b. Ensure compliance with National and State Office policy and direction for prescribed fire activities and ensure that periodic reviews and inspections of the prescribed fire program are completed.

c. Review Prescribed Fire Plans and recommend or approve plans depending upon the delegated authority. When approving a Prescribed Fire Plan, understand the risks associated with it. Ensure that the Prescribed Fire Plan has been reviewed and recommended by a qualified technical reviewer who was not involved in the plan preparation.

d. Ensure interdisciplinary team coordination occurs at all planning, monitoring and evaluation levels. Ensure compliance of plans with standards for public land/rangeland health where these standards are in place.

e. Ensure that only trained and qualified personnel participate in the implementation portion of the prescribed fire program. Establish qualification review committees. Ensure that prescribed fire training goals and individual development plans are identified for individuals participating in the prescribed fire program.

f. Ensure that escaped prescribed fires are reviewed.

g. Ensure that projects are monitored, evaluated, and reported as a part of the fire record.

h. Ensure participation in local smoke management programs.

D. Other Prescribed Fire Responsibilities

1. Fire Management Officer: The Fire Management Officer (FMO) has overall responsibility for planning, implementing and monitoring of the prescribed fire program, in accordance with National and State Office policy and direction. Specific duties may be delegated to the Fuels Management Specialist or other staff.

a. Ensures compliance with National and State Office policy and direction.

b. Coordinates with people requesting prescribed fire projects.

c. Ensures that proposed project sites are reasonably capable of meeting the proposed objectives.

d. Ensures that trained and qualified personnel are available to participate in the prescribed fire program. Assigns Prescribed Fire Burn Bosses.

e. Assigns people to participate in Prescribed Fire Plan preparation.

f. Reviews Prescribed Fire Plans. Note: The FMO reviews the Prescribed Fire Plans if the FMO is not the preparer or Technical Reviewer. The purpose of the FMO review is to; gain general familiarity needed to assess the impact of the project on the units workload, to include the project in the units AWP, to assess the units ability to implement the project and to assess the need for additional implementation resources.

g. Acts as liaison/coordinator to the Prescribed Fire Manager and/or Prescribed Fire Burn Boss, local dispatch office, other BLM offices, other agencies, air quality authorities, news media, transportation agencies and safety officials.

h. Ensures that daily accomplishments and resources committed for fuels management projects are reported through the local dispatch office and comply with national reporting guidelines.

i. Ensures that fuels management projects and assist actions are reported through the Bureau=s reporting system (DI-1202s).

2. Prescribed Fire Plan Preparer: See Chapter 5 for qualifications.

For the purpose of this document, the Prescribed Fire Plan Preparer is defined as the individual responsible for the preparation of the Prescribed Fire Plan. Several people may be involved in the preparation of the Prescribed Fire Plan but the Prescribed Fire Plan Preparer is responsible for the final plan content.

a. Prepares the Prescribed Fire Plan in accordance with Bureau policy and

direction.

b. Coordinates with the resource management specialists to ensure that the plan meets resource management objectives.

c. Is a member of the interdisciplinary team that completes the necessary NEPA documentation.

3. Technical Reviewer: See Chapter 5 for qualifications.

a. Ensures that Prescribed Fire Plans meet BLM policy and direction.

b. Ensures that the Complexity Rating is appropriate for the planned project and that the rational supports the assigned rating.

c. Ensures that the Management Summary and Complexity Rating accurately represent the project, so the Agency Administrator understands the identified risks and the mitigating measures enacted.

d. Checks the prescription parameters against the fuel types to ensure that the project as planned has a reasonable chance of meeting the resource management objectives.

e. Ensures that the fire behavior calculations are correct.

f. Ensures that the holding and ignition plans are consistent with the predicted fire behavior.

g. For projects involving an AUrban Interface@ area, an on-site review is required.

h. Completes the Prescribed Fire Plan review checklist.

E. References

The following Bureau Manual sections may be referenced.

1. 1112 - Safety and Health Management

2. 1203 - Delegation of Authority

3. 1386.6 - Tort Claims

4. 1619 - Activity Plan Coordination

5. 1625.3 - Supplemental Program Guidance for Support Services

6. 1740 - Renewable Resource Improvements and Treatments

7. 1743 - Renewable Resource Investment Analysis

8. 1790-1 - NEPA Handbook

9 9210.2 - Fire Management - Financing

10. 9211.3 - Fire Planning - Prescribed Fire Plan

11. 9215 - Fire Training and Qualifications

12. 9217 - Fire Effects

13. 9218.3 - Fire Reporting and Statistics

Other References

1. 910 DM Chapter 1 - Wildland Fire Suppression and Management

2. *NWCG Prescribed Fire Plan Guide*, NFES 1839/PMS 431-1

3. Federal Fire and Aviation Leadership Council, Increasing Programmatic Accomplishments and Reducing Agency Differences in Prescribed Fire Management (1/10/96)

4. *NWCG Prescribed Fire Smoke Management Guide* - NFES 1279/PMS 420-2

5. *User Assessment of Smoke-Dispersion Models for Wildland Biomass*. PNW-GTR-379 (12/96)

6. *Interagency Helicopter Operations Guide* - NFES1885, and the Aerial Ignition Guide - NFES 1080

7. *BLM Standards For Fire Operations.*

8. *National Interagency Mobilization Guide* - NFES 2092

9. *NWCG Wildland Fire Qualifications Subsystem Guide* - NFES 1414/PMS 310-1

10. Fire Effects Information System. Intermountain Research Station General Technical Report INT-GTR-327 describes the system content. This database is found on the Internet at www.fs.fed.us/database/feis/

11. Index to fire-related web sites (www-a.blm.gov/narsc/wildland fire/index.html/intro.html)

12. *NWCG Glossary of Wildland Fire Terminology* - NFES 1832/PMS 205

13. *NWCG Prescribed Fire Complexity Rating Guide* - NFES 2474/PMS 424

14. Aids to Determining Fuel Models for Estimating Fire Behavior - NFES 1574, General Technical Report INT-122

15. *NWCG Fire Effects Guide* - NFES 2394, PMS 481

16. NWCG Publication Management System (www.nwcg.gov)

17. BLM Fire Report instructions (www.nifc.blm.gov)

18. 516 DM Chapters 1-7, Managing the NEPA process

19. *Federal Wildland Fire Management Policy and Program Review*. Final Report

20. *Federal Wildland Fire Management Policy and Program Review*. Implementation Action Plan Report (5/23/96)

Chapter 2: Prescribed Fire Definition and Planning

A. Prescribed Fire Definition

Prescribed fire is defined as the application of fire, under specified conditions, in a designated area to achieve specific resource management objectives. A written, approved Prescribed Fire Plan must exist, and all NEPA requirements must be met prior to ignition. For further definitions related to prescribed fire, refer to the *NWCG Glossary of Wildland Fire Terminology*, NFES 1832/PMS205.

B. Prescribed Fire Program Planning

The Bureau=s prescribed fire activities are a coordinated interdisciplinary effort supported by Resource and Fire Management. All benefitting activities will coordinate their respective roles for the planning, implementation, monitoring, evaluation, reporting and funding of prescribed fire projects. Resource Management is responsible for managing vegetation and soils. Fire Management is responsible for identifying hazardous fuel situations and managing ignitions.

All use of prescribed fire will support land and resource management plans. Resource management plans (RMPs) or other land use plans (See Chapter 2, Section C.) serve as the document to initiate, analyze and provide the basis for using prescribed fire to meet resource objectives.

The Fire Management Plan (FMP) is the program strategy document for prescribed fire activities; it captures and quantifies the overall fuels management program needs of the Field Office. The FMP identifies how prescribed fire, along with other fire management strategies, will be used to meet the overall land management goals identified in land use plans. The FMP also identifies the average annual funding and workforce needed to manage, coordinate, plan and implement the fuels management program.

Natural resource management objectives are the driving force behind the fuels management program. Although the Phase One fire planning identifies fuels management opportunities, it often does not provide the level of detail needed to move directly to prescribed fire projects. It is required that prescribed fire projects be planned and analyzed using an interdisciplinary process. National Environmental Policy Act (NEPA) compliance is required for all prescribed fire projects.

The Prescribed Fire Plan is the site-specific implementation document. It includes the specific resource objectives and fire treatment objectives to be achieved by prescribed fire. The Prescribed Fire Project Planner is responsible for preparing the Prescribed Fire Plan. It is preferable to assign a Prescribed Fire Burn Boss when the project is initially proposed and require that individual to be responsible for, or at least participate in, developing the Prescribed Fire Plan. Fire Managers must maintain close coordination and communication among interdisciplinary team members and other involved participants. The team leader or other resource specialist may be assigned to work with the Fire Management staff or Fuels

Management Specialist in developing the Prescribed Fire Plan. This helps to ensure that the desired resource management objectives are accomplished. This individual could also serve as the Manager=s representative or resource advisor during the actual burn.

C. Prescribed Fire Project Planning

The steps below are the general process for planning and implementing a prescribed fire project. *Note: This section is focused on specific project planning and is not intended as an overview of the Bureau=s planning process.* The basic process is the same as for planning and implementing any other project. Ideally, this process should be initiated on a three-year planning cycle. At a minimum, prescribed fire projects need to be initiated the fiscal year prior to implementing the expected project.

1. Source documents: Land use plans are the primary planning documents through which prescribed fire projects will be identified. These documents will identify the management goals and constraints that project planners and coordinators will need, guiding NEPA analysis and Prescribed Fire Plan development. Common planning documents include:

Management Framework Plans (MFPs)
Resource Management Plans (RMPs)
Allotment Management Plans (AMPs)
Habitat Management Plans (HMPs)
Fire Management Plans (FMPs)
Coordinated Resource Management Plans (CRMPs)
Herd Management Area Plans (HMAPs)
Watershed Management Plans

Supporting documents such as recovery plans and conservation agreements may also provide information for planning purposes.

2. Preliminary site review: Resource specialists and Fire Management personnel and/or the Fuels Management Specialist should do an on-site review to determine the potential success of a proposed prescribed fire project. This is also the point in the process at which to include outside groups and individuals, as appropriate. Use other sites that have been burned in the same vegetation type, climate conditions, and soil types to assess the general suitability of the project. If the recommendation is to proceed, a Project Coordinator or Interdisciplinary Team Leader should be assigned, and a Prescribed Fire Plan and project checklist started. Be sure to include any Allowable Area outside of the planned prescribed fire area if such areas are applicable to the project. (See Chapter 3, Section A, Item 21.)

For the purpose of this document the AAllowable Area@ is defined as an area(s) outside of the planned prescribed fire area where an escape need not be declared until additional conditions as identified in the Prescribed Fire Plan are met.

Appendix 1 is an example of a Site Review Checklist and Appendix 2 is an example of a Job Planning Checklist. These forms are provided as an aid and their use is NOT required.

3. Project objectives: The desired resource objectives need to be discussed and confirmed. Develop clear concise statements(s) of what is to be accomplished (resource

objectives) from a resource management standpoint. There should be a reasonable opportunity to attain the resource objectives and measurable factors and timeframes that determine the degree of success. Specific prescribed fire treatment objectives are then written to describe the fire treatments needed to meet the resource objectives. State exactly what the prescribed fire should and should not do, e.g., kill 40 to 60 percent of the sagebrush within the perimeter; do not burn the critical habitat areas identified within the unit, etc. Any project constraints are also identified at this time. Constraints may be identified from land use or other activity plans or may have been developed during the environmental analysis process. For additional information on developing resource and related fire objectives, refer to Chapter 2, Section E.

4. Concurrences: Seek other program input and identify the amount of time and personnel commitment needed to develop and implement the project. Obtain initial management approval for the project.

5. Data collection: Identify and collect any needed field data, such as botanical and archeological information, and fuel inventories. Review monitoring data from previous projects and incorporate ALessons Learned@ into the current project.

6. National Environmental Policy Act: NEPA compliance is required for all prescribed fire projects. The environmental analysis discloses the effects **of using or not using** prescribed fire in a specific geographic area at a specific time. The Agency Administrator must determine what level of NEPA analysis is required. The NEPA Coordinator can help determine the level of analysis needed and address issues relating to conformity with existing plans and analysis. NEPA compliance could take the form of a programmatic environmental assessment (EA) that covers a number of related treatments (mechanical and prescribed fire) in association with the Fire Management Plan. A single analysis could also be appropriate for large-scale projects or multiple projects within a defined area up to and including an entire planning area. Where proposed treatments are not compatible with the existing planning documents, a plan amendment and associated NEPA documentation may be appropriate. The effort and workload for project planning and NEPA compliance for a small project are often the same as those required for a larger project. Prescribed Fire Planning and related NEPA analysis should always occur at the largest possible spatial and temporal scales.

7. Clearances and permits: Several types of clearances, permits and other authorization documents may be required and should be obtained as early as possible in the planning process. These generally are cultural resource clearances, threatened/endangered species clearances, and air quality permits, and may also include land owner agreements or releases and assistance or cooperative agreements. Be sure to include any Allowable Area outside of the primary burn area if such areas are applicable to the project. (See Chapter 3, Section A, Item 21.) Complete copies of all such documents, including mitigation measures and biological opinions and associated terms and conditions, should be included in the Prescribed Fire Plan and/or the Project File.

8. Review and approval: The completed Prescribed Fire Plan receives a technical review by a qualified individual. The plan is then submitted for approval by the Agency Administrator.

9. Annual Work Plan (AWP): Ensure that the project is included in the AWP. The Hazardous Fuel Reduction subactivity (2823) is controlled by AWP target production levels.

As part of the AWP process, determine that project funding is available and what portion each subactivity will fund. Ensure that other agency and/or cooperator funding identified during the planning is available. Ensure that the project is included in the Management Information System (MIS) workload target. Assign a Prescribed Fire number and a Range Improvement Project System (RIPS) number, if applicable.

D. Smoke Management

As per public law 95-95, compliance with Federal, state and local air quality regulations is mandatory and will require coordination with state and local air quality authorities. Smoke management can also be a significant part of determining the complexity of a prescribed fire project.

The National Wildfire Coordinating Group (NWCG) publication *Prescribed Fire Smoke Management Guide*, NFES 1279/PMS 420-2, provides a guide to the understanding of smoke management concepts. Several computer models including Simple Approach Smoke Estimation Model (SASEM), NSF puff (NSFPUFF), VSSMOKE (VSSMOKE-GIS), and the Ventilated Valley Box Model (VALBOX) are available to help determine the potential smoke impacts on a given area. *User Assessment of Smoke-Dispersion Models for Wildland Biomass Burning*, PNW-GTR-379 (12/96), is a guide to the available smoke models.

Personnel developing Prescribed Fire Plans must be aware of state and local regulations and the impacts that a specific project may have on critical areas. Potential smoke impacts on critical areas such as Class I air sheds, restricted areas, and non-attainment areas (often called designated areas) must be considered. Equally important are local features that could be impacted, such as highways, airports, recreation sites and smaller population centers. Prescribed Fire Plans need to identify sensitive areas and provide operational guidance to minimize the impacts from smoke.

States and/or Field Offices may have MOUs (Memoranda of Understanding) or operating plans that impact prescribed fire implementation. Prescribed Fire Plans need to show compliance with these documents, memoranda, and operating plans.

If potential negative impacts from smoke could occur, an assessment of potential downwind impacts using an appropriate smoke management model will be completed. Some states require that some type of smoke dispersion modeling be done before they issue prescribed fire project permits.

E. Resource and Fire Treatment Objectives

The Prescribed Fire Planning process is initiated by guidance established in land use plans and amendments. Land use plan guidance may be in the form of general goals that deal with large areas over long time periods. While prescribed fire may be mentioned in land use plans, resource objectives that define prescribed fire use in specific areas are most often developed in activity plans. During the prescribed fire planning process, the interdisciplinary team refines these objectives into very site-specific resource management objectives that describe the longer term desired changes in site conditions, such as increased plant productivity, altered species composition, or increased off-site water yield. These resource objectives describe second-order fire effects that result from the interaction over time of the immediate changes in the environment caused by the prescribed fire.

Prescribed fire treatment objectives describe first-order fire effects, e.g., fuel consumption, plant mortality, soil heating, and burn pattern. These are the effects which the fire must create to achieve the site-specific resource objectives. Prescribed fires are conducted under selected weather and fuel moisture conditions to create fire behavior characteristics and residual fuel burnout that are most likely to produce these direct and immediate effects of the fire.

Both resource and fire treatment objectives need to be specific, measurable, achievable, related to the land use plan goals, and have definite timeframes for achievement, monitoring, and evaluation. The timeframe for achievement of resource objectives is usually two or three years. The timeframe for fire treatment objectives is immediate because they are achieved during the course of the prescribed fire.

The following section provides a series of examples that show derivation of fire treatment objectives from land use plan goals, activity plan objectives, and prescribed fire resource objectives.

1. Forb production:

a. Land Use Plan goal. Provide quality habitat to support a diversity of wildlife species.

b. Activity plan resource objective. Improve mule deer spring range in mountain big sagebrush communities in the Big Creek watershed.

c. Prescribed fire resource objectives. Increase the production of forbs from 100 pounds per acre (air-dried weight) to 200 to 300 pounds per acre by the end of the third full growing season after the prescribed fire by removing competition from sagebrush. Leave 30 to 40 percent of the area unburned.

d. Fire treatment objective. Kill 100 percent of mountain big sagebrush by burning with enough fireline intensity to kill the sagebrush and to remove fine branchwood less than 1/4 inch in diameter. Burn in a mosaic pattern leaving 30 to 40 percent of the area unburned in patches 25 acres or larger.

2. Browse enhancement:

a. Land Use Plan goal. Provide quality habitat to support a diversity of wildlife species.

b. Activity plan resource objective. Improve mule deer winter range in mountain shrub communities in the Big Creek watershed.

c. Prescribed fire resource objectives. Increase the production of fine twigs by inducing resprouting in serviceberry, with 90 percent plant survival after the second growing season. Increase browse availability by removing old, nonproductive branches. Leave at least 20 percent of the area unburned in a mosaic pattern.

d. Fire treatment objectives. Burn with high enough fireline intensity to remove serviceberry branchwood less than 2 inch in diameter on 90 percent of the plants.

Sustain no more than 10 percent mortality of mature serviceberry plants. Burn in a mosaic pattern, leaving at least 20 percent of the area unburned in 10 to 25 acre patches.

3. Watershed restoration:

a. Land Use Plan goal. Restore the Big Creek watershed.

b. Activity plan resource objective. Increase water yield and decrease siltation into Big Creek and its reservoir.

c. Prescribed fire resource objectives. Increase July stream flow in Big Creek from the 20-year average of 100 cfs to a five-year average of 150 to 200 cfs within five years by removing juniper cover that has invaded into mountain big sagebrush communities. Increase the canopy cover of grasses and forbs from 10 percent to 20 to 40 percent within three growing seasons.

d. Fire treatment objectives. Generate adequate flame length to kill at least 80 percent of the junipers that are less than 10 feet tall, and achieve 30 to 40 percent mortality of trees taller than 10 feet. Leave at least 20 percent of the area unburned in a mosaic pattern with unburned patches of 20 to 50 acres. Sustain less than 10 percent mortality of bunch grasses.

After reviewing the fire treatment objectives that the Fuels Management Specialist believes are possible on this site given the fuels, the interdisciplinary team may decide that the juniper mortality after one prescribed fire is not adequate to meet resource objectives. It may be determined that manual cutting of taller trees is necessary before the prescribed fire, or that a second prescribed fire treatment is needed after the understory has recovered to a more productive state with greater canopy cover.

4. Hazardous fuels reduction

a. The intent of a treatment can be a first-order fire effect hazardous fuels reduction, identified in the Fire Management Plan. There may be other fire effects worth including as objectives to ensure that fuels are managed without harming other desirable site properties.

b. Land Use Plan goal. Manage fuels in the wildland/urban interface.

c. Fire Management Plan objective. Manage ponderosa pine stand structure in the area of BLM ownership adjacent to Newtown to decrease potential for crown fire, and decrease both intensity and severity of surface fires.

d. Treatment objectives. Kill 90 percent of understory Douglas fir with stem diameter of less than two inches. Consume 90 percent of down-and-dead woody fuels in the zero-to-three-inch size class. Remove 50 percent of the duff, leaving some duff cover on 60 percent of the area. Kill no more than 10 percent of trees larger than 12 inches in diameter.

F. Monitoring

Each Field Office will develop a minimum monitoring program that will allow fire and resource managers to determine if the fire treatment and resource objectives are being met.

The minimum monitoring requirements established for individual prescribed fire projects include weather during the fire, observed fire behavior and whether fire treatment objectives have been met. If slowly changing fuel moisture values, such as live fuel or soil moisture, are included in the prescription, actual values should also be documented.

Monitoring is the consistent collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting management objectives. Prescribed fire monitoring can be defined as a systematic process for collecting and recording information to provide a basis for evaluating and adjusting resource and fire treatment objectives, prescriptions, and implementation practices. In prescribed fire monitoring, information is also gathered to document the treatment itself.

Inventory is a point-in-time measurement of the resource to determine location or condition. It can be a prerequisite for monitoring, such as determining the amount and distribution of fuels on a prescribed firesite or locating and mapping sensitive features. Specific treatment objectives and constraints may be identified from the inventory information.

Monitoring long term resource objectives is the responsibility of the resource programs. Resource monitoring will be most successful if it is coordinated with the monitoring of the prescribed fire. Correlations among fire prescriptions, fuel loading, fire behavior and characteristics, fire treatment and resource objectives, and fire effects are much more likely to be observed if all information is collected in the same general area.

Prescribed fire funds (2823) can be used up to one year after the fire for monitoring treatment objectives. It is recognized that fire treatment effects such as plant mortality may not be evident for some time after the prescribed fire, although they should be evident during the first postburn growing season. If mortality assessment is postponed for too long, the mortality may be due to an interaction of other elements with the fire treatment, such as drought, and effects may be attributed to the fire which are partially due to other factors.

Additional information on monitoring can be found in Appendix 7.

Chapter 3: Prescribed Fire Plan Requirements

A. Prescribed Fire Plans

The Prescribed Fire Plan is the site-specific implementation document. It is a stand-alone and legal document that provides the Prescribed Fire Burn Boss with all the information needed to implement the project. Prescribed fire projects must be implemented in compliance with the written plan. If a tort action occurs as a result of a prescribed fire, the Prescribed Fire Plan is always considered as evidence. The size and complexity of the prescribed fire project will determine the level of detail required. Should an element not apply to a specific project, an NA (not applicable) may be utilized. At a minimum, address each of the elements discussed below.

In some cases, Prescribed Fire Plans may be developed on an interagency basis. Interagency Prescribed Fire Plans do not need to follow the BLM format described below. Prior to development of the Prescribed Fire Plan, a format will be agreed upon by all involved parties. The content of all elements required in a BLM Prescribed Fire Plan must be present somewhere in the interagency plan. BLM participation in the development of the Prescribed Fire Plan will be commensurate with the magnitude of the project. Multi-agency plans will be reviewed and signed by all participating Agency Administrators.

For any project on BLM land for which a contractor writes a Prescribed Fire Plan, that plan must be consistent with and address all elements required in a BLM Prescribed Fire Plan. The BLM will provide the technical review for contractor or cooperator written plans.

For any project on BLM-managed land where the BLM writes the Prescribed Fire Plan and a contractor or cooperator will be implementing the project, the contractor or cooperator will be provided the opportunity to review and comment on the Prescribed Fire Plan prior to approval.

For any project on BLM managed land where fire protection is provided by another agency, that agency will be provided the opportunity to review and comment on the Prescribed Fire Plan prior to final approval.

The dispatch office responsible for the area in which the prescribed fire will occur will be provided pertinent information related to the project prior to ignition. It is recommended that the dispatch office be given a complete copy of the Prescribed Fire Plan.

Each Prescribed Fire Plan should be reviewed annually by the FMO or Fuels Management Specialist to ensure that the plan is valid and represents current field conditions. Any Prescribed Fire Plan written prior to 1998 which has not yet been implemented must be reviewed and amended to assure that all elements required under current policy are included. Such plans will receive a new technical review and a new approval by the Agency Administrator.

Prescribed Fire Plan Elements, Part I - Cover page (See cover page format in Appendix 3.)

1. Prepared by: The signature of the person who prepared the plan (the Prescribed Fire Plan Preparer). Several people may be involved in preparing the plan, but only one person will be designated as the lead and is responsible for the final plan content..

2. Reviewed by: The signature(s) of the other specialist(s), such as the NEPA

Coordinator, resource specialist, or others, who may review the plan to assure compliance with Bureau policy, land management documents, guidance, and objectives. The FMO will review and sign all Prescribed Fire Plans, if the FMO was not the preparer or technical reviewer. Also see Chapter 3, Section A, for additional review criteria.

3. Technical review: The signature of the person performing the technical review. The technical review ensures that all items required in a Prescribed Fire Plan are adequately addressed. The technical review must be completed by someone not involved in the preparation of the Prescribed Fire Plan. (See Chapter 1 for the Technical Reviewer=s responsibilities and Chapter 5 for qualifications.) The technical review checklist will be completed and signed by the reviewer and becomes part of the project file. If an office cannot complete its own technical review, the State Office will ensure that a technical review is completed by a qualified person. A primary reviewer will be designated; however, it is acceptable for other specialists to review specific portions of the Prescribed Fire Plan. For example, a Fire Behavior Analyst may review the fire behavior calculations or the Aviation Officer may review the Air Operations Plan. For those offices that do their own technical reviews, the State Office will ensure that a percentage (a minimum of one per year) of the Prescribed Fire Plans are reviewed by an outside individual.

4. Complexity rating: Indicate the level of complexity. The *NWCG Prescribed Fire Complexity Rating System Guide* is the Bureau standard for complexity rating. This rating system must be used for all Bureau prescribed fires. Appendix 6 is an alternative format that utilizes the *NWCG Prescribed Fire Complexity Rating System*. This format provides the opportunity to provide a rational for each rating each element. The *NWCG Prescribed Fire Complexity Rating System Guide* provides a rating system for Risk, Potential Consequences, and Technical Difficulty as they relate to 14 specific elements and provides a summary rating. For additional information on complexity, see Chapter 4.

5. Estimated cost: Show the estimated cost per acre to implement the project and list specific funding sources. (Also see item 21.)

6. EA and RIPS numbers: Reference the assigned EA number and Range Improvement Project System (RIPS) number if applicable.

7. Plan approval: Approval of the Prescribed Fire Plan by the appropriate Agency Administrator. This may be at the State, District, or Field Office level, depending on the Delegation of Authority. When approving the plan, it is understood that:

The approved Prescribed Fire Plan constitutes a Delegation of Authority to burn. No one has the authority to burn without an approved plan or in a manner not in compliance with the approved plan. Actions taken in compliance with the approved Prescribed Fire Plan will be fully supported. Personnel will be held accountable for actions taken which are not in compliance with elements of the approved plan.

This statement will appear on the cover or signature page of all Prescribed Fire Plans.

Prescribed Fire Plan Elements, Part II - Management Summary

8. Management summary and risk assessment: The Management Summary is a brief summary of the project and potential impacts to the project area and surrounding areas.

Specifically discuss public and firefighter safety. Include a summary of the risk, potential consequences and technical difficulty of the project. All elements with a AHigh@ rating and those elements that are higher than the summary rating in the complexity analysis will be discussed and will identify potential consequences and mitigating measures. Identify the actions to be taken to reduce the complexity (if any). Specifically identify any unmitigated risks or issues. Keep this section brief, generally do not to exceed one page.

Prescribed Fire Plan Elements, Part III - Base Data

9. Resource objectives, fire treatment objectives and constraints: Identify the resource objectives from the EA. Develop clear, concise statement(s) describing what is to be accomplished from a resource management standpoint. There should be a reasonable opportunity to attain the resource objectives, and there should be measurable factors and timeframes that determine the degree of success. (See Chapter 2, Section E.)

Specific prescribed fire treatment objectives are then written to describe the fire treatments needed to meet the resource objectives. State exactly what the prescribed fire should and should not do.

This section will also describe any identified constraints. Constraints may have been identified as part of the resource objectives, may be identified in the EA, or may be contained in a biological assessment or conservation agreement.

10. Physical description: A description of the burn unit(s) including location (township, range and section or latitude and longitude), elevation(s), slope, aspect, county, size, topography, and acreage by ownership. This section will also contain a description of the fuels including the fuel model(s), loadings, continuity and general description. Other items may be added as needed.

11. Maps: Generally, two maps may be necessary to locate a project -- a general vicinity map and project area map. The vicinity map should tie the area to the Field Office or nearest town. The project area map is required and has two specific purposes: 1) identify features (roads, firelines, water sources, smoke-sensitive sites, etc.) related to the project and 2) identify all items that the Prescribed Fire Burn Boss needs to be concerned with should the fire escape. This includes items such as the project boundaries, roads, water sources, fences, structures, other improvements, and fuel breaks. All maps should include standard mapping elements: title, north arrow, scale, legend, the preparer=s name and the date of preparation.

Clearly identify any Allowable Areas boundaries as identified in item 21.

Prescribed Fire Plan Elements, Part IV - Fire Prescription and Environmental Parameters

12. Fire prescription and environmental parameters: **The prescribed fire prescription is a description of the fire behavior needed to obtain the fire treatment and resource objectives**. The prescription will also contain specific parameters for live fuel moisture, duff and/or soil moisture and wind speed if those items are significant in terms of meeting the project objectives.

Weather parameters such as temperature, relative humidity and wind speed are used primarily to determine fire behavior. The fire prescription will also identify limitations on acceptable fire behavior for critical holding points outside of the planned prescribed fire area.

Prescriptions for fuels with a significant living component will have an element related to live fuel moisture. Prescriptions for projects in timber (under burns) will have at least one element related to site dryness. This could be 1,000-hour fuel moisture, duff moisture or soil moisture. Until the moisture relationships among these items can be established for specific areas, more than one of the elements may need to be measured.

If two (or more) fuel models are present (significant portion), it is necessary to discuss the prescription and fire behavior for each fuel model. Significant differences in slope, aspect, or elevation may require prescription modifications.

A separate prescription is needed for black-lining operations **if** conditions will be significantly different from the primary prescription or **if** the holding resources differ from those identified for the primary ignition and burnout phase. It is not adequate to state that black lining will occur at the low end of the prescription **unless** all of the holding resources identified on the ignition and holding portion of the plan will be on site.

The fire behavior narrative should describe the fire behavior identified in the prescription and discuss how it will achieve the desired treatment objectives. It will be necessary to discuss fire behavior in terms of firing patterns and techniques. The environmental parameters guide the prescribed fire behavior.

Briefly discuss the scheduling of the project. Indicate the season of the burn and discuss any limitations or restrictions that apply to the project.

13. Fire behavior calculations: Develop the fire behavior calculations based on the BEHAVE fire prediction program. Other fire behavior related programs may be used as a supplement to help identify the fire behavior needed to obtain the fire treatment and resource objectives. At a minimum, calculations for rate of spread and flame length will be developed. **If** multiple fuel types or different topography exist within the project or adjoining areas, several sets of calculations will be needed. Additional calculations for areas with the greatest potential for escape (critical holding points) will be needed if the fuels and or topography are different than within the burn unit. **If** the prescription for black lining operations is significantly different from the primary prescription, a separate set of fire behavior calculations is needed. Attach the fire behavior calculations to the Prescribed Fire Plan.

14. Smoke management: Describe how the project will comply with Federal, state and county air quality regulations. Describe any emission reduction techniques that will be used. The Prescribed Fire Plan should identify any Class I air sheds, restricted areas, non-attainment areas (designated areas), and population centers that could be impacted downwind or from nighttime inversions. Local features such as highways, airports, and recreation sites, and other impact zones should also be identified. If potential negative impacts from smoke could occur, an assessment of potential downwind impacts using an appropriate smoke management model must be completed.

A smoke trajectory map should be developed and included **if** significant negative impacts from smoke could occur. Develop a contingency plan for unanticipated smoke impacts.

Some state regulatory agencies require that modeling be done and non-impact be demonstrated prior to issuing a burn permit. Describe any smoke monitoring requirements.

Restrictions on acceptable wind direction(s) or other environmental parameters can be incorporated as needed into the Prescribed Fire Plan to avoid or help mitigate anticipated adverse impacts from smoke. (See Chapter 2, Section D.)

15. Monitoring Plan: A monitoring plan is required. It will describe what data will be collected, when they will be collected, where on the prescribed fire site they will be collected, which methods will be used for each data element, and list the responsible persons. The DI-1202 form requires completion with site and fire information collected as part of the monitoring process. The reporting system also requires the recording of the fire perimeter with a reference map.

The minimum requirements established for prescribed fire monitoring include weather during the fire, observed fire behavior and whether fire treatment objectives have been met. If slowly changing fuel moisture values, such as live fuel or soil moisture, are included in the prescription, actual values should also be documented.

For additional information on monitoring, see Chapter 2, Section F and Appendix 7.

Prescribed Fire Plan Elements, Part V - Implementation

16. Notifications: Provide a list of individuals and organizations to be notified prior to ignition. Show when the notification is to be made (e.g., 24 hours in advance), provide current phone numbers and indicate who will make the notification.

Notification of adjacent landowners and agencies is required prior to ignition.

17. Organization and equipment: Identify the organization and equipment needed to implement the project. The organization needs to be commensurate with the complexity level of the project. At a minimum, a Prescribed Fire Burn Boss will be assigned to every prescribed fire project. The organization and holding forces described in the approved Prescribed Fire Plan will be used to implement the burn.

18. Air operations organization/plan: If aerial firing is specified in the Prescribed Fire Plan, a specific air organization and air operations section will be included. Reference the *Interagency Helicopter Operations Guide, Aerial Ignition Guide* and the 9400 manuals. Field Offices doing extensive aerial ignition may wish to develop generic air operations plans and attach pertinent portions to the Prescribed Fire Plan.

19. Ignition and holding: Specific descriptions of ignition and holding procedures are required. For projects with more than one unit, the information should be provided for each unit. This section should provide the general procedures to be used for operations to maintain the fire within prescription and the project area. Specifically discuss the protection of sensitive features

within or adjacent to the burn site. Specific procedures and instructions may depend on the actual weather and fuel conditions at the time the project is implemented. Because the prescribed fire prescription is determined in terms of fire behavior, the ignition patterns and procedures will play a critical role in meeting the fire behavior prescription. A detailed discussion of ignition operations may be needed. Depending on the complexity of the situation, a map showing the

location of the holding forces and the ignition pattern may be desirable.

This section will also include a discussion of preburn preparation, specifically discussing what preburn actions (e.g., firelines, hose lays, water sources, etc.) are needed, what standards will be used and who is responsible for completing each item.

20. Mop up and patrol: The mop up and patrol plan should outline the procedures to be implemented between the time the area is burned and the time it is declared out. A detailed description of the mop up and patrol procedures should be noted in this section. The Mop Up Shift Plan will be used to provide instructions and document mop up and patrol instructions.

A significant number of prescribed fires that escape do so during the mop up and patrol phases. Almost all escapes are the result of **high wind events** and many are **preceded by a period of warming and drying**. Another factor contributing to many escaped prescribed fires is **heavier than normal fuel loadings** both within and adjacent to the burn unit. Above-average fuel loadings should be recognized as a potential problem and changes should be made to all operational activities as appropriate.

21. Escaped Fire Plan: Identify the actions to be taken if the fire escapes the perimeter lines and cannot be contained with the resources identified in the plan. Specifically, identify who will make the decision that the prescribed fire has escaped. If appropriate, identify key trigger points or events that will lead to the declaration of an escape. Identify how the transition to the Incident Command System will be made, who will be the Incident Commander, and what specific actions will be taken. The escaped fire plan should also list containment opportunities outside of the planned prescribed fire perimeter (if any). List the notification to be made if an escape occurs. (See Chapter 8 for additional information on escaped prescribed fires.)

The concept of an AAllowable Area@ can be incorporated into Prescribed Fire Plans. These are areas outside of the planned prescribed fire area where an escape need not be declared until additional conditions as identified in the Prescribed Fire Plan are met. If a prescribed fire leaves the primary burn unit and enters the Allowable Area, this section will identify the actions the Prescribed Fire Burn Boss will take to manage the fire within these areas; this section will also identify any key containment opportunities and critical holding points; it will also identify trigger points at which an escape will be declared. Allowable Areas will always be identified on the project maps, included in the planning process and covered in the NEPA documentation. The concept of Allowable Area may not apply to all prescribed fire projects or to all parts of a specific project.

22. Job Hazard Analysis (JHA): Develop a JHA to identify hazards to employees. The analysis will identify hazards, corrective actions and the required safety equipment to ensure employee safety. If aerial ignition devices will be used, include an aerial operation hazard analysis to determine procedures and safety requirements.

Appendix 5 is an example and can be used as a starting point for building a JHA for a specific prescribed fire project. Using the example as a starting point, delete items which do not apply and add new items as needed. Attach the JHA to the Prescribed Fire Plan.

23. Public safety: Describe the provisions made for public safety. List specific items such as road or trail closures and signing.

24. Medical plan: Develop a Medical Plan with specific information, locations and contacts. Ensure that contacts and phone numbers are current.

25. Communications Plan: Develop a project-specific communications plan. If aerial ignition is to be used, a separate frequency for communications between the aircraft and Ignition Specialist and/or Prescribed Fire Burn Boss will be established. Also, provide a current list of needed phone numbers.

26. Go/No-Go checklist: This checklist will be completed and signed by the Prescribed Fire Burn Boss prior to ignition, on the day of the burn, and retained as part of the project file. The Go/No Go process requires the concurrence of the Prescribed Fire Ignition Specialist and the Prescribed Fire Holding Specialist. At a minimum, all of the items shown in the Go/No-Go checklist in Appendix 3 will be used. Additional items may be added to the standard checklist as needed.

27. Prescribed fire briefing: Develop a Prescribed Fire Briefing Checklist. Appendix 3 provides a sample outline; however, a specific checklist needs to be developed. Ensure that any significant items identified in the JHA and mitigating measures are included in the checklist and briefing. (See also Chapter 5, Section A.) After the briefing is completed, the checklist will be signed and dated by the Prescribed Fire Burn Boss and retained as part of the project file.

28. Test fire: A test fire will be used to verify that the fire behavior will achieve the fire treatment and resource objectives. The test fire will be done in a location that can be easily controlled or extinguished and be representative of the general fuel type and other conditions in the burn unit. Documentation of the test fire conditions and results is required. This documentation will be signed by the Prescribed Fire Burn Boss and retained as part of the project file.

29. Project cost: Develop a detailed cost summary with estimated costs and source(s) of funding. Include any contributed funding.

Prescribed Fire Plan Elements, Part VI - Reports

30. Prescribed Fire Report: A postburn evaluation and summary that documents burn day weather and fuel conditions, observed fire behavior, problems, concerns, and recommendations for future projects (if any) is required. The prescribed fire results must be compared to the fire treatment objectives and resource objectives that were identified for the project. The Prescribed Fire Report must be completed and signed by the Prescribed Fire Burn Boss and retained as part of the project file.

Appendix 3 is an example of a Prescribed Fire Plan that addresses all of the above elements and meets the minimum Bureau standards. Local units may add additional items to meet their needs.

B. Implementation

OBTAINING A SPOT WEATHER FORECAST ON THE FIRST DAY OF THE BURN, PRIOR TO IGNITION, IS MANDATORY. THE PRESCRIBED FIRE BURN BOSS

WILL MONITOR THE GENERAL FORECASTS AND DECIDE ON THE NEED FOR ADDITIONAL SPOT WEATHER FORECASTS.

Note: An exception can be made for piled slash or debris where spread beyond the piles is not expected.

The Prescribed Fire Burn Boss or other person in charge of mop up and patrol needs to review the general weather forecast and determine if a spot weather forecast is needed.

The weather service office responsible for providing the general and spot weather forecasts will be provided a copy of the Prescribed Fire Plan, including maps, well in advance of the planned ignition. The most desirable situation is for the Prescribed Fire Burn Boss or Prescribed Fire Manager to have direct contact with the person providing the forecast. The Prescribed Fire Burn Boss should always provide feedback regarding the weather forecasts.

The dispatch office responsible for the area in which the prescribed fire will occur will be provided pertinent information related to the project at least several days prior to ignition. It is recommended that the dispatch office be given a complete copy of the Prescribed Fire Plan. The FMO, Prescribed Fire Manager, or Prescribed Fire Burn Boss should discuss with the responsible dispatch office what their prescribed fire roles and responsibilities are.

If the Prescribed Fire Burn Boss assigned to the project was **NOT** involved in planning the project and/or writing the Prescribed Fire Plan, that individual will be afforded the opportunity to review the Prescribed Fire Plan and inspect the project site prior to implementing the project.

The Prescribed Fire Burn Boss will be responsible for implementation including mop-up and patrol until the responsibility is formally passed to another individual.

Notification of adjacent landowners and agencies is required prior to ignition.

There needs to be a clear understanding among Agency Administrators, fire management and the Prescribed Fire Burn Boss as to which parts of the Prescribed Fire Plan (if any) may be changed on the site prior to implementing the project. This information may be included in the plan or it may be established as a state or local policy. On-site changes to the Prescribed Fire Plan **will not** include changes to the objectives or the fire behavior prescription. Examples of changes that might be permitted are minor boundary adjustments, minor changes in the amount or type of holding or ignition resources required or changes in ignition patterns(s), techniques, or sequence. Any changes to the Prescribed Fire Plan by the Prescribed Fire Burn Boss will be noted on the original copy of the Prescribed Fire Plan and dated and initialed by the Prescribed Fire Burn Boss.

Prescribed Fire Plans that are amended or where major changes occur must identify the affected sections, the reason for the change(s) and have the changes clearly identified. New signatures for the Technical Reviewer and Agency Administrator are required. Note: This refers to significant changes, not minor on-site changes as discussed above.

C. Implementation Restrictions

Implementation of Prescribed Fires at National Preparedness Levels IV and V is restricted. (See the National Mobilization Guide.)

At National Preparedness Level IV, concurrence by the State Fire Management Officer (SFMO) must be obtained before implementing the local Agency Administrator=s recommendation for a prescribed fire. An evaluation of significant risk is made by the SFMO or representative in a presentation of the prescribed fire implementation proposal to the geographic multi-agency coordinating (MAC) group prior to prescribed fire approval. A coordination/tracking function will be established to track prescribed fires and resource commitments at geographic area and national coordination levels.

At National Preparedness Level V, a national level representative must concur with the SFMO=s recommendation. The national level representative will present an evaluation of significant risk in a proposal to the national MAC group prior to prescribed fire approval.

D. Project Files

There will be only one official prescribed fire project file. All other related files or documents will be referenced in the project file. BLM Records Schedule 4, item 20 and Schedule 17, item 3, discuss the storage of project files.

The project file will, as a minimum, contain:

1. The Prescribed Fire Plan and all attachments

2. A copy of the NEPA documents

3. Maps and photos (pre- and postburn)

4. Agreements (to include outside funding agreements), contracts, and permits

5. The Prescribed Fire Report, Go/No Go Checklist, briefing checklist, and test fire documentation

6. General and spot weather forecast, weather and fire behavior observations, fuel moisture data, unit logs, and a copy of the Fire Report (DI-1202)

7. Monitoring and evaluation information

8. Projected and actual cost information. A MIS report for the project should be included.

9. Names and locations of pertinent GIS files

The original project file will be kept with the Field Office files. Fire Management staff and/or the Fuels Management Specialist should keep copies for reference.

Chapter 4: Prescribed Fire Complexity

A. Determination of Complexity

The NWCG *Prescribed Fire Complexity Rating System Guide*, January 2002 (NFES 2474, PMS 424), is the required Bureau standard for rating prescribed fire complexity. A complexity rating will be completed for each prescribed fire project. The determination of the prescribed fire complexity will be based on an assessment of **risk** (the probability or likelihood of an unexpected event or situation occurring), **potential consequences** (some measure of the cost or result of an undesirable event or situation occurring), and **technical difficulty** (the level of skills needed to complete the project **and** deal with expected events).

Classify prescribed fire projects by the complexity elements using the definitions provided in the NWCG guide. It is important to note that all of the 14 elements have distinct definitions for high, moderate or low. These definitions must be used when preparing the rating. All of the individual elements must be rated. If a specific element does not apply to a given project, indicate it as N/A. Additional elements may be added if needed. The Complexity Elements Work Sheet and summary rating become part of the Prescribed Fire Plan. As appropriate, also bring any necessary items to the Management Summary and Risk Assessment, the Job Hazard Analysis and the briefing checklist. Appendix 6 is an example of an alternative format that may be utilized. While the example is different, the NWCG rating system and required elements are still the basis for the Complexity Rating.

An initial complexity rating should be completed during the project development stage to identify items needing mitigation. These items can then be addressed during the development of the Prescribed Fire Plan. When doing the complexity rating be sure to consider areas outside of the project boundaries that could be impacted by smoke or could be impacted if the fire escaped. Once the Prescribed Fire Plan is near completion, the final complexity rating is made and the summary rating is entered on the cover page of the Prescribed Fire Plan. The final rating should take into account any mitigation included in the plan. The mitigating measures identified in the plan should be noted in the Management Summary and Risk Assessment portion of the plan.

Based on the NWCG classification system, three prescribed fire complexities are possible. In addition to the complexity rating, any prescribed fire meeting one of the items below will be classified at the level indicated, regardless of the overall rating.

1. High -- **Prescribed fires (other than pile burning) in the wildland/urban interface**. The wildland/urban interface is more than an area or zone where structures meet or intermingle with wildland fuels. It is a set of conditions where structures and/or other improvements are reasonably within the reach of an escaped prescribed fire. This determination must include the factors of fuel type, fire behavior prescription, topography and containment opportunities.

2. Moderate -- All aerial ignitions must be classified as at least moderate complexity.

B. Complexity and Qualifications

The Prescribed Fire Complexity System does not tie directly to the Prescribed Fire Qualifications System. The following direction will apply.

1. All prescribed fire projects rated as High Complexity will require a Prescribed Fire Burn Boss rated as RXB1 and an Ignition Specialist rated as RXI1.

2. Prescribed Fire Burn Boss 3 (RXB3): As a supplement to the qualifications system, the BLM has identified an additional position, a Prescribed Fire Burn Boss 3 (RXB3). (See Chapter 5 for specific qualifications.)

The intent of the position is to qualify a person to supervise prescribed fire operations that would have very few personnel assigned, have a very low threat of escape, and present minimal risk to the people involved in the operation. The types of operations that can be supervised by a RXB3 are limited to: the burning of piled slash, landings, ditches, and debris. (Note: These types of operations still require an approved Prescribed Fire Plan; however, the detail of the plan should be commensurate with the scope of the project.)

The Agency Administrator and the FMO have the final responsibility for determining the management level on any prescribed fire. Many prescribed fire projects not rated as AHigh Complexity@ still have one or more components that may warrant a higher level of management. Projects with large organizations and/or with complex logistical needs are examples where managers may want to consider the use of an RXB1.

Chapter 5: Safety and Qualifications

A. Safety Awareness

The safety of fire fighters and the public is the number one priority when planning and implementing a prescribed fire project. Every person involved in a prescribed fire project is responsible for identifying safety issues and concerns. It is the responsibility of each individual participating in prescribed fire activities to notify management of any possible misunderstanding of assignment tasks or safety concerns related to the assignment.

All personnel will be briefed prior to any prescribed fire assignment. The briefing will ensure that all involved parties understand how the project will be implemented and what their assignments are. Briefings must cover safety considerations for both known site-specific hazards and potential hazards. A briefing checklist must be developed and attached to the Prescribed Fire Plan. A briefing will be given for each operational period of multi-period projects. (See Chapter 3, Section 3 and Appendix 3.) Briefing checklists will be signed by the Prescribed Fire Burn Boss and retained as part of the project file.

A JHA will be completed for each prescribed fire project and attached to each Prescribed Fire Plan (JHA BLM Form 112-3, Manual Section 1112). The JHA should be completed early in the planning process so that significant issues can be mitigated as the Prescribed Fire Plan is developed. Appendix 5 is an example of a generic JHA for a prescribed fire and is set up in a checklist type format. The checklist can be used as a starting point with additional, site-specific items added as needed. Significant safety items will also be identified in the Management Summary and Risk Assessment and will be discussed at the project briefing(s). If significant safety issues are identified that can not be mitigated, consider the addition of a qualified fire Safety Officer to the burn organization.

The SAFENET form and process (IM OF&A 2000-006) is designed for reporting and correcting unsafe situations and is applicable to prescribed fire operations. To be most effective, the SAFENET should be submitted to the first line supervisor (for prescribed fire operations this would be the Prescribed Fire Burn Boss or the Fire Management Officer). The SAFENET may also be submitted electronically at www.nifc.gov.

B. Safety Equipment

All personnel on a prescribed fire project will be equipped with required Personal Protective Equipment (PPE) appropriate to their position or as identified in a JHA. For holding and ignition personnel, the minimum PPE (unless otherwise identified in the JHA) is the same as that required for wildland fire assignments. This includes:

8" high laced leather boots with lug soles
Fire shelter
Hard hat
Aramid shirt
Aramid trousers
Leather gloves

The JHA will determine when eye and hearing protection is required.

C. Smoke Exposure

Exposure to smoke during prescribed fire operations can be a significant safety concern. Research has shown that smoke exposure on prescribed fires, especially in the holding and ignition positions, often exceeds that on wildfires. There are many precautions that Prescribed Fire Project Planners and Prescribed Fire Burn Bosses can take to reduce personnel exposure to smoke.

1. Planning: Smoke exposure needs to be considered when planning prescribed fires. Simple actions such as altering line locations can have a significant impact on smoke exposure. Placing firelines in areas of lighter fuels or moving lines to roads or other barriers that will require less holding, patrol and mop up will significantly reduce the smoke exposure to personnel.

2. Implementation: Many techniques can help reduce the exposure of personnel to heavy smoke. Rotating people out of the heaviest smoke area may be the single most effective method. Changing firing patterns and pre-burning (black lining) during less severe conditions can greatly reduce exposure to smoke. The use of retardant, foam or sprinklers can also significantly reduce the workload and exposure time for holding crews.

D. Risk and Safety Mitigation

Agency Administrators must consider the importance of making well-thought-out decisions in planning and implementing prescribed fire due to the far-ranging impacts that may occur in a very short timeframe and their resulting consequences.

1. Risk management: Managers should use a systematic process to identify and manage risk to reduce the chances of a prescribed fire escape or other undesirable event by ensuring that:

a. The Prescribed Fire Plan includes an accurate risk assessment and identifies the potential consequences should the fire escape the planned perimeter.

b. The Prescribed Fire Plan has considered threats to life and property, smoke management concerns, potential impacts on key resources, public land users, cooperators and communities.

c. The FMO, FMS and Prescribed Fire Burn Boss are fully aware that prescribed fire risks must be acknowledged and minimized and that the Go/No-Go checklist, briefing checklist, and Job Hazard Analysis are required in every Prescribed Fire Plan. Stress that the project must be implemented in compliance with the Prescribed Fire Plan.

d. Resources (time, budget, staffing, equipment) are adequate to implement the prescribed fire project, prior to giving initial approval for the project.

e. The FMO, FMS, and Prescribed Fire Burn Boss monitor Geographic Area prescribed fire activity. What is occurring in and around the Geographic Area? Have adjacent units been experiencing escaped prescribed fires? Are adequate contingency resources available?

f. The FMO, FMS and Prescribed Fire Burn Boss review long range Weather/National Fire Danger Rating System indices, live fuel moistures and fuel loadings.

g. Safety is not compromised and no deviation from the Prescribed Fire Plan is allowed.

2. Quality: Managers must insist on high quality standards by:

a. Setting high-quality prescribed fire standards as a unit goal.

b. Insisting that prescribed fire projects are evaluated upon completion.

c. Correcting any deviations from established National and State Office policy and direction.

d. Knowing the Bureau=s Prescribed Fire Plan requirements and referencing them as needed when approving Prescribed Fire Plans.

3. Supervision and control: Managers must support the policies and procedures established to safely conduct prescribed fire operations by:

a. Openly demonstrating a commitment to prescribed fire safety.

b. Considering safety as an integral part of prescribed fire accomplishments.

c. Uniformly supporting the Bureau=s prescribed fire policy and direction.

d. Ensuring that managers, resource specialists and fire managers make trips to prescribed fire projects to promote interaction with the Prescribed Fire Burn Boss and crew members.

e. Ensuring good communication up and down the chain of command in prescribed fire operations.

f. Insisting on daily and/or shift safety briefings and viable, safe alternatives when performing high-risk prescribed fire operations.

g. Asking the FMO, FMS, and Prescribed Fire Burn Boss to clarify questions or doubts.

h. Realizing that a Prescribed Fire Report is required for every project and ensuring that reports are completed by the Prescribed Fire Burn Boss and resource specialist(s) involved. The postburn report is concise documentation of the project, including summaries of what went right and what needs improvement for the next project. Request copies for review.

4. Process auditing: Managers must ensure a system of ongoing checks by members of the organization to identify any hazardous conditions and to take corrective action by:

a. Ensuring that periodic reviews and inspections of the prescribed fire program are completed. Does the program follow Bureau policy and direction? Are safety practices and operating standards followed?

b. Having prescribed fire training goals and individual development plans for

interested staff; use subject matter expert boards or interagency review committees to determine prescribed fire qualifications.

c. Ensure that a qualified person prepared the Prescribed Fire Plans.

d. Insisting on an independent, qualified, technical review of all Prescribed Fire Plans.

5. Reward system: Managers should establish a system of rewards or disciplinary actions resulting from either safe or unsafe actions by:

a. Recognizing prescribed fire/safety achievements in the home unit through praise, formal awards and incentives.

b. Reinforcing safe prescribed fire operations as a norm (by management emphasis and peer pressure).

c. Encouraging all involved personnel to report safety discrepancies or plan deviations without fear of negative repercussions (SAFENET).

d. Taking timely action(s) to appropriately reward positive actions or to discipline unsafe behavior, operations or attitudes.

E. Positions, Duties and Qualifications

1. General qualification requirements: The State Director and the Agency Administrator are both responsible for establishing State Office and Field Office qualification committees. These committees review experience, training, currency and fitness levels, ensure proper completion of taskbooks and make recommendations regarding prescribed fire qualifications to the Agency Administrator.

Several key organizational positions shall be considered when implementing any prescribed fire project. **Not every project will require that each prescribed fire position be filled**. Some projects may require additional positions. Each Field Office planning a prescribed fire project will identify the required positions and build an organization necessary to implement the project. **At a minimum, a Prescribed Fire Burn Boss will be assigned to every prescribed fire**.

2. The National Wildland Fire Coordinating Group (NWCG) issues the *Wildland and Prescribed Fire Qualification System Guide* (PMS 310-1). This guide provides a complete review of the qualification system and includes the *Taskbook Administrators= Guide* that explains the taskbook process for documenting performance and certifying personnel. The BLM has additional requirements for some prescribed fire positions. The qualifications for each position are shown in the chart below. All BLM personnel assigned to prescribed fire operations will meet the minimum qualifications outlined in this section. This will include personnel assigned to assist other agencies even though the other agency may have established its own (lower) qualifications.

3. Prescribed Fire Position Duties: The NWCG has defined the duties for key prescribed fire positions as shown below. Chapter 4 discusses the issue of complexity as it relates to prescribed fire operations. The Prescribed Fire Manager, Prescribed Fire Burn Boss and

Ignition Specialist each have two skill levels. The assignment of skill levels to a given project is dependent on the complexity of the project. The BLM has established a standard for High Complexity projects and has restricted the use of the RXB3 position.

a. Prescribed Fire Manager (RXM1/RXM2): The Prescribed Fire Manager is responsible for implementing and coordinating assigned prescribed fire activities. A Prescribed Fire Manager may be assigned during periods when multiple, simultaneous prescribed fires are being conducted, multiple prescribed fires will be conducted within a short timeframe or where there is a complex interagency involvement. Key duties and responsibilities include:

-- Obtaining briefings from ordering officials and/or the prior Prescribed Fire Manager.
-- Reviewing Prescribed Fire Plans prior to implementation and assessing the situation.
-- Acting as liaison/coordinator for the Prescribed Fire Burn Boss, local dispatch offices, other offices and agencies, air quality authorities, news media, transportation agencies and safety officials.
-- Obtaining and interpreting long-term weather information.
-- Conducting strategy meetings and/or briefings as needed.
-- Setting priorities for allocation of resources.
-- Briefing Prescribed Fire Burn Bosses and directing operational assignments according to agency-specific policies, priorities and standards.
-- Monitoring overall prescribed fire operations.
-- Ensuring that all operations are conducted in a safe manner and in accordance with the Prescribed Fire Plans.
-- Ensuring the completion of all required documentation, including the evaluation and documentation of accomplishments, immediate fire behavior and fire effects, operational procedures and costs summaries.

b. Prescribed Fire Burn Boss (RXB1/RXB2): The Prescribed Fire Burn Boss is responsible to the agency administrator or Prescribed Fire Manager for implementing the Prescribed Fire Plan. Key duties and responsibilities include:

-- Reviewing Prescribed Fire Plans prior to implementation and ensuring that plan requirements are met.
-- Doing a reconnaissance of the site.
-- Maintaining communication with the FMO and/or Agency Administrator.
-- Obtaining weather forecasts, updates and advisories from a meteorologist.
-- Making the go/no-go decision.
-- Conducting the personnel/safety briefing to ensure a safe operation.
-- Conducting the test burn.
-- Supervising assigned personnel.
-- Directing the ignition, holding and monitoring operations.
-- Ensuring that a log records all activities during each operational period.
-- Determining when the prescribed fire is not within prescription parameters or is not meeting project objectives.
-- Managing the incident or overseeing the transition to another Incident Commander if an escape occurs.

-- Evaluating and documenting objective accomplishments, operational procedure, assigned personnel and costs.

-- Declaring the prescribed fire out.

-- Ensuring that reports are completed.

Note: The BLM has established an additional level of Prescribed Fire Burn Boss, the RXB3, to qualify a person to supervise some prescribed fire operations. These types of operations typically would have few personnel assigned, a very low threat of escape and present a minimal risk to personnel involved in the operation. The use of the RXB3 is limited to the burning of piled slash, landings, ditches, and debris.

c. Ignition Specialist (RXI1/RXI2): The Ignition Specialist is responsible for supervising and directing ground and/or aerial ignition operations according to established standards in the Prescribed Fire Plan. Key duties and responsibilities include:

-- Reviewing the Prescribed Fire Plan and the burn unit prior to implementation.

-- Instructing crews on project objectives and ignition operations. Conducts ignition operations in a safe manner.

-- Completing the test fire according to the ignition plan at the direction of the Prescribed Fire Burn Boss.

-- Igniting the project area according to the ignition plan.

-- Identifying the impacts of ignition on control and desired fire effects.

-- Coordinating ignition operations with the Holding Specialist.

d. Fire Effects Monitor (FEMO): The Fire Effects Monitor is responsible for collecting the on-site weather, fire behavior and fire effects information needed to assess whether the fire is achieving established resource management objectives. Key duties and responsibilities include:

-- Reviewing the monitoring plan prior to implementation.

-- Doing a reconnaissance of the burn unit/area assigned.

-- Monitoring and recording on-site weather data.

-- Monitoring and recording fire behavior data.

-- Plotting the burn area and perimeter on a map.

-- Monitoring and recording smoke management information.

-- Monitoring first-order fire effects.

-- Providing a monitoring summary.

e. Resource Advisor: Key duties and responsibilities include:

-- Advising the Prescribed Fire Burn Boss regarding the accomplishment of resource objectives.

-- Coordinating with landowners and permittees.

4. Prescribed fire qualifications summary:

Bold print represents BLM additional requirements and positions.

Position	**Qualified As**	**Required Training**	**Suggested Training**	**Physical Fitness**	**Position Taskbook**
RXB1	RXB1	None		None	Required
RXM2	RXB2	None		None	Required

Position	Qualified As	Required Training	Suggested Training	Physical Fitness	Position Taskbook
RXB1	RXB2 + ICT3	S-490 **RX-450**	RX-540 ECOSYS* FPM*	**Light**	Required
RXB2	RXI2 + ICT4	S-390 **RX-300** **RX-340** **BEHAVE**	RX-450 FPM* I-300	**Moderate**	Required
RXB3 *(a)	**ICT5**	**S-290**	**S-201**	**Arduous**	**None**
Prescribed Fire Holding Specialist *(b)	Appropriate ICS Qualification				
RXI1	RXI2 + **STL(any) or TFLD**	**RX-340**		**Arduous**	Required
RXI2	SRB(Any)	**S-234**	Ignition devices	**Arduous**	Required
FEMO	FFT2	S-290 **RX-340**	S-244	**Arduous**	Required
Prescribed Fire Plan Preparer *(c)	**RXB1/ RXB2**		**ECOSYS***	**None**	**None**
Prescribed Fire Technical Reviewer *(d)	**RXB1/ RXB2**			**None**	**None**
Agency Administrator *(e)	**N/A**	**Fire Mgmt. Leadership/ SFMO Briefing**		**N/A**	**N/A**

* ECOSYS = Fire and Ecosystem Management
* FPM = Fire Program Management

a. Prescribed Fire Burn Boss 3 (RXB3). The BLM has restricted the types of projects. (See Chapter 4.)

b. Prescribed Fire Holding Specialist: The qualification for Holding Boss is the appropriate ICS Operations position. The Holding Boss will be qualified at the Single Resource Boss, Strike Team Leader, Task Force Leader, Division Supervisor, Operations Section Chief level as required by the number and mix of the resources assigned to the holding operation.

For some projects, there may be no holding requirements or the holding duties are assumed by the Prescribed Fire Burn Boss.

c. Prescribed Fire Plan Preparer: The person responsible for preparing the Prescribed Fire Plan. The Prescribed Fire Plan Preparer may have other personnel assist in preparing the plan, but is responsible for the final plan content.

d. Prescribed Fire Technical Reviewer: For prescribed fire projects rated Complex, e.g., those projects requiring an RXB1, the technical reviewer must be qualified as, or previously qualified at, the RXB1 level. For those Prescribed Fire Plans rated Moderate or Low, the technical reviewer must be qualified as, or have been previously qualified at, the RXB2 level. If a Field Office cannot complete its own technical review, the State Office will ensure that a

technical review is completed by a qualified person. A primary reviewer will be designated; however, it is acceptable for other specialists to review specific portions of the Prescribed Fire Plan. For example, a Fire Behavior Analyst may review the fire behavior calculations or the Aviation Officer may review the Air Operations Plan.

e. Agency Administrator: Mandatory training is Fire Management Leadership. Additionally, a detailed briefing from the State Fire Management Officer regarding the roles and responsibilities relating to the prescribed fire program with emphasis on the Prescribed Fire Plan approval process is required. At a minimum, the manager will receive a copy of the *Prescribed Fire Handbook*, H-9214-1, and will review the appropriate sections with the State Fire Management Officer. This is a one-time briefing, not a recurring requirement.

5. AGrandfathering@ of personnel is no longer permitted. Some offices will need to determine the proper qualification level for new or transfer personnel who will be involved in prescribed fire operations. Agency Administrators and Fire Management Officers need to review all the wildland fire training, wildland fire experience, prescribed fire training and prescribed fire experience and determine at what level each individual should be qualified.

The qualifications system is a performance-based system; as such, the individual=s ability to do the job is the primary consideration. Performance is demonstrated through completion of position taskbooks. The formal training is an important, but partial, consideration.

There are key points to consider when reviewing the training side of the qualifications issue. The **required** training courses are: Basic Firefighter Training, S-130, the Fire Behavior Skills Courses, S-190, S-290, S-390, S-490, and RX-300, RX-340, and RX-450. All of the other training is defined as **Knowledge and Skills Needed**. One method of evaluating individuals is comparing the individual=s skills and abilities against the tasks listed in the taskbook for a given position. If there is sufficient evidence that the individual has performed all of the tasks in a given taskbook and has all of the **required** training, the individual can be qualified at that level.

Once the level of qualification for an individual has been determined, a letter or memo stating the level of qualifications should be drafted, signed by the Agency Administrator and placed in the personnel file. The appropriate entries then need to be made into the Incident Qualification and Certification System (IQCS). It may be necessary to do some management overrides within the system to obtain the proper qualifications for an individual.

At this point, advancement in the system requires that all **required** training be completed and that the appropriate taskbook(s) be completed.

6. Currency requirements: The prescribed fire qualifications system does not establish currency requirements to maintain prescribed fire qualifications. The currency requirement is set at five years, the same as for suppression qualifications. As with suppression qualifications, an assignment at one level will maintain prescribed fire qualifications at the next higher level.

7. Recording and tracking prescribed fire qualifications: The Bureau uses IQCS to track prescribed fire qualifications, training and experience. BLM Manual Section 9215, Fire Training and Qualifications, establishes State Office and Field Office responsibilities for maintaining qualification, training and experience records. All records of prescribed fire

qualifications, training and experience will be entered into the IQCS. The IQCS does not screen for the additional prescribed fire training required by the BLM; manual screening will be needed. Prescribed fire qualifications will appear on individual red cards, which are approved by the appropriate Agency Administrator.

The IQCS does not separate prescribed fire qualifications by fuel type. The Fire Management Officer and Agency Administrator are responsible for ensuring that Prescribed Fire Burn Bosses and Ignition Specialists have qualifications, training and experience appropriate for the fuel types in which they will be working, regardless of their red card rating.

Agency Administrators may sign red cards for other agency employees only by a written agreement with the other agency.

8. Physical fitness levels are not established by the NWCG. The Bureau has established physical fitness levels as shown in the chart in Section 4. The fitness levels for Prescribed Fire Burn Boss are less than those required for ICT3. If the Prescribed Fire Burn Boss is not qualified as an IC, a qualified IC will be identified in the Escaped Fire Plan. Additionally, the transition of control from the Prescribed Fire Burn Boss to the IC will be explained in the Escaped Fire Plan.

Note: The IQCS does not check for the additional training requirements identified in Section 4 or for Prescribed Fire Physical Fitness requirements. Managers will need to check these items manually.

F. Program Manager Qualifications

The BLM has established minimum qualification standards for prescribed fire program managers.

1. Prescribed Fire and Fuels Technician/Specialist:
   - A Prescribed Fire Burn Boss 2 (RXB2)
   - A Strike Team Leader/Task Force Leader or ICT4
   - A S-490
   - A Working knowledge of smoke management techniques
   - A Working knowledge of fire effects (RX-340 level)
   - A Working knowledge of the NEPA process

2. National and State Office Prescribed Fire and Fuels Management Specialist:
   - A Prescribed Fire Burn Boss (RXB2)
   - A Division Supervisor, Unit Leader, or ICT3
   - A S-490
   - A Advanced knowledge of smoke management techniques (RX450 level)
   - A Advanced knowledge of fire effects (RX540 level)
   - A Working knowledge of the NEPA process

For personnel currently occupying a prescribed fire, fuels management, or fire use position that do not meet the above criteria, the supervisor is responsible for developing an IDP which will allow the individual to meet the above criteria within two years.

Chapter 6: Project Financing

A. Project Funding for Prescribed Fire

Prescribed fire projects will be funded by equitable cost-sharing. Funding for implementation of prescribed fire projects must be identified and agreed to at the Field Office level. It is the responsibility of each program area (non-fire) to cover its own regular (base-eight) salaries and fixed costs. This applies to items such as preliminary site assessments, writing EAs, developing Prescribed Fire Plans, obtaining clearances, training and monitoring. Regular salaries for fire management staff (except dedicated Fuels Management Specialists) involved in prescribed fire activities are programmed in Preparedness (2810), identified in the FMP and considered part of the most efficient level (MEL).

Fire Management Officers and Fuels Management Specialists will actively seek funding from other BLM activities and outside sources in support of prescribed fire and other fuels treatments.

Fund code guidance for the Hazardous Fuel Reduction Operations Subactivity (2823)

This subactivity is commonly referred to as the Fuels Management Program. The Congressional intent of this funding source is to focus on implementation. The 2823 subactivity requires a project number with all expenditures. Project number YY99 is used with costs associated with general fuels program activities not tied to a specific project. This includes things such as training, non-implementation travel, major equipment purchases, administrative costs and program management. The term Program Support is commonly used to identify activities and costs associated with the use of the YY99 project number.

Complete funding guidance is contained in IM No. OF&A 2000-016.

Uses of Funds

A Includes the costs of implementing prescribed fire, mechanical, and chemical treatments to reduce hazardous fuels and to restore fire to its natural role in ecosystems.

A Includes mechanical and chemical treatments necessary to alter fuels as a precursor to the introduction of fire in its natural role.

A Includes funding of prescribed fire, mechanical and chemical treatments to remove undesirable vegetation as the first step in ecosystem restoration, *but excludes* subsequent mechanical and chemical treatments, plantings, and seedings to establish the desired vegetation.

A Includes the costs of construction and maintenance of fuel breaks that are part of a scientifically planned, NEPA compliant network of strategically located connected areas where fuel characteristics are modified to break up continuity of hazardous fuels. To develop a network of connected areas, cooperative agreements with partners may be necessary.

A Excludes treatment of fuels generated in conjunction with commodity production activities, such as timber stand improvement and slash.

A Excludes type conversions where the principal purpose is for commodity production.

A Excludes annual maintenance of landscaping, transportation corridors, and right-of-ways.

Labor Costs

A Includes regular planned salaries for all Afuels@ management permanent full-time personnel who are dedicated for the full year to non-commodity production fuels management activities. Includes shared positions with other agencies. Permanent full-time fuels or forest management personnel who also have responsibility for treatment of fuels associated with commodity production must pro-rate their salary.

A Includes salaries for career seasonal and seasonal personnel hired specifically for fuels management project implementation.

A Includes salaries for hours worked by qualified non-fuels management personnel with responsibility for developing a project burn plan(s). Does not include salary for non-fuels management personnel performing programwide planning activities (fire or non-fire) which address general fuels management activities.

> For example, the office's Range Specialist has been integrally involved in the prescribed fire program, is qualified and has shared or been the lead in developing burn plans, and will continue to do so regardless of whether they benefit the range management program. The employee's salary for the hours worked can be charged to the project. However, this does not include salaries for non-fuels personnel working in general planning, such as land use plans, Fire Management Plans (FMP=s), and other program activity plans.

A Includes salaries for the hours actually worked on implementation for all non-fuels management personnel (fire or non-fire) who are a formal part of the unit=s prescribed burn implementation team.

> For example, the office's Wildlife Biologist is a qualified ignition specialist and is used on all prescribed burns on and off the field unit's lands regardless of wildlife program benefits. The employee's salary for the hours worked implementing the project can be charged to the project.

A Includes costs of project development and clearances for permanent full-time support personnel (such as archeologist, environmental compliance specialist, and T&E Biologist) who may not have regular planned base salaries and are funded on a project-by-project basis. Funding is only for the hours worked on a project when their discipline is not a benefitting activity. Also includes the costs for these same activities if they are performed by qualified temporary hires and contracted specialists.

> For example, the office's archeologist, if funded on a project-by-project basis, or the contract archeologist can charge salary for the time worked on the specific

project. Funding should only be for the level of work needed to perform the basic task(s) meeting compliance requirements commensurate with the anticipated disturbance. But, fuels funds do not cover the archeologist=s salary to perform general surveys on lands that someday may be burned through wildland fire or prescribed fire.

A Includes overtime and premium pay for all personnel, fire and non-fire permanent, career seasonal, or seasonal, while actually involved in project implementation.

A Includes the regular planned (base-8) salaries for all fuels program managers who code to 2823 subactivity and project code YY99 when serving on wildland fires. These employees only change the project code (YY99) that designates program management to the wildland fire number on which they are working. Career seasonals and temporaries who are hired for project-specific fuels work will charge all their labor costs to 2821 and the fire number as soon as they are assigned to a wildland fire. Funds planned for fuels projects should not be used while serving on wildland fires.

For example, the state office fuels manager plans their full year's salary in the 2823 subactivity and uses the project code of YY99 to designate their work as program management support. When assigned to a wildland fire, they continue to code their base-8 to 2823 but replace the fuels project code (YY99) with the fire number. This is the same procedure that applies to all fire management personnel budgeted in the preparedness (2810) subactivity. Fuels personnel who are strictly hired for project implementation (career seasonals and seasonals) stop charging their labor to the fuels program (2823) as soon as they are assigned to a fire. They code all of their time to the suppression subactivity (2821). NOTE: While not common, some career seasonals might be hired as the field unit's fuels program manager; those employees would follow the same coding procedure as a PFT fuels program manager.

A Excludes regular planned salaries for all Anon-fuels@ fire and non-fire permanent full-time personnel other than permanent full-time fuels management personnel and forest management personnel who also have responsibility for treatment of non-commodity fuels, or as previously described have lead roles in burn plan development or are formal members of the prescribed fire team. Fuels management funds for non-fuels personnel performing covered roles, as previously described, are not spread to the respective disciplines to be used as base annual funding. These employees only charge to the specific project as the work is performed. Career seasonal and seasonal personnel hired under another fire subactivity or a non-fire appropriation may not charge their base salary to the hazardous fuel reduction operations subactivity. However, appointments for non-fuels career seasonal and seasonal employees may be extended using hazardous fuel reduction operations funds when dedicated to specific fuels project activities regardless of the original purpose of hire. Seasonal employees cannot be extended beyond the annual 1039 hour limitation.

For example, career seasonal and seasonal fire and non-fire management employees hired to perform either preparedness and/or non-fire activities may be extended beyond their planned primary employment period to perform project-specific fuels treatment activities. But these extended employees may not be held over between projects by coding to the YY99 program management support code.

A Excludes all costs associated with general land management planning such as ecosystem plans, land management plans (RMP=s), and program management plans (e.g., AMP=s, HMP=s, and FMP=s) for all but the fuels program managers. Program support fuels management personnel assigned to general land management planning activities should continue to code labor costs to their base-8 (2823) subactivity and use the YY99 project code.

> For example, a fire manager working on an RMP or FMP would code all of their regular planned salary (base-8) to the 2810 subactivity, even if the work addresses fuels management. A forester working on a RMP or an activity management plan would code to their regular planned subactivity for all labor costs, which they should be doing when addressing ecological disturbances even if they address fire and fuels.

A Excludes all costs of managerial oversight which is normally funded through general administrative or non-fire program management funds. Fire program managers, such as State, District, and Field Office Fire Management Officers (FMO=s), should code to the Preparedness activity which covers general fire program management and readiness.

> For example, the local fire manager would code to preparedness (2810) even when performing fuels activities such as working on a prescribed burn. They would add the project number to their usual 2810 coding, reflecting the full costs of the project, just as they would for their base-8 salary when they are working on a wildland fire.

Travel and Per Diem Costs

A Includes travel and per diem for all personnel involved with project implementation activities. These costs would be part of project implementation and coding would use the specific fuels project number, not YY99.

A Includes travel and per diem for all approved personnel associated with developing, managing, and attending fuels management training and workshops as well as National Wildfire Coordinating Group's (NWCG) certified prescribed fire curriculum. These costs would be part of the office's fuels management program support and would use the AYY99" project number. Career seasonals brought back for fuels training during their normal time off would code their time and other expenditures to 2823-HT-YY99.

Administrative Support Costs

A Includes administrative support costs but can only be assessed at the organization level directly responsible for implementing fuels management activities. This fee cannot exceed five (5) percent of the Field Office's target allocation. Subactivity 0777 (general purpose, non-program specific support costs) cannot be assessed to the fuels management program.

Aircraft Costs

A Includes flight time associated with hours actually worked on a project. Usually Call-When-Needed aircraft are more economical for fuels management activities than extending

Preparedness (2810) contract aircraft and paying for both the availability and flight time. There may be exceptions so an analysis should be performed to determine the most economical method before extending the length of an aircraft contract.

Public Awareness Costs

A Includes the cost of public awareness activities for specific projects.

A Excludes costs associated with general fire education/awareness activities and general information about the use of fire or other generic fuels management activities.

Smoke Management Costs

A Includes costs of smoke management activities, labor, permits, contracts and support.

Monitoring and Analysis Costs

A Includes costs for establishing plots for monitoring fire behavior, fuel moisture, and direct effects of the fire treatment, and immediate post-treatment monitoring of these plots. Long-term effects monitoring and analysis should be funded by the activities with responsibility for management of the vegetation. NOTE: Fuels program managers may be involved with long-term monitoring to gain additional information for the fuels program.

Contracting

A Includes all costs associated with contracting. Contracts can be used for all, or portions of, project development and implementation.

Equipment Purchases

A Includes purchase of capitalized equipment needed for the average annual workload that cannot be economically contracted, leased, or rented. Capitalized equipment is identified as equipment with acquisition costs equal to or greater than $10,000. Before the standard procurement process is initiated, the proposed purchase must be supported by an analysis of cost alternatives and submitted with a request to authorize the purchase to the State FMO. Purchases should always consider cost sharing with other activities and/or statewide sharing. Heavy equipment, including vehicles, tractors and other mechanized equipment, should not be purchased. The purchase price of this category of items can be misleading as it only represents a portion of the total long-term indirect costs, such as maintenance, operations, training, storage, and liability.

A Includes the cost of replacing equipment destroyed while being used on a fuels management project and will require a Board of Survey action.

Miscellaneous Costs

A Includes costs of moving fuels management personnel (PCS moves).

A Includes costs of procuring office equipment for permanent fuels management

personnel.

A Includes costs of all supplies directly related to project development and implementation.

A Includes leave surcharge.

B. AD Pay Plan

The AD pay plan may be used to supplement regular personnel assigned to hazardous fuel reduction projects but is limited to prescribed fire projects. The term of hire is restricted to no greater than the period beginning 24 hours prior to planned ignition and extending through 24 hours after the perimeter is secured. The AD pay plan may be used only to provide temporary support due to the unpredictable nature of fire use hazardous fuel reduction activities and may not be used to circumvent normal hiring and contracting procedures. The host unit agency is responsible for paying AD hires under this plan for prescribed fire projects.

C. Hazard Pay

Current policy is that hazard pay will not be paid for any prescribed fire. [Note: An interagency proposal covering hazard pay on prescribed fires has been developed and submitted to the Office of Personnel Management. This proposal would permit the payment of hazard pay on prescribed fires under some conditions. If and when this proposal is approved, an Instruction Memorandum will be issued.]

Should a prescribed fire become a wildfire, suppression policies will govern the conduct and use of hazard pay.

D. Escaped Prescribed Fires

When any prescribed fire is declared a wildland fire, it is suppressed using the concept of Appropriate Management Response. All costs associated with the suppression actions will be charged to the 2821 subactivity. A Fire Number must be assigned for this purpose. (See Chapter 8 for escaped fires and Chapter 9 for fire reports.)

E. Contracting for Services

The Bureau can contract to conduct all or part of the prescribed fire operations and/or all or part of mechanical treatments for hazard fuel reduction projects. Standard contracting procedures must be followed. Extra care must be taken when developing specifications for prescribed fire contracts. The exact service or end product must be carefully described to ensure the desired outcome.

Contractor personnel conducting prescribed fire operations must meet the same qualification, experience, and fitness requirements as BLM personnel would if they were conducting the operation (See Chapter 5 for qualification information.)

By definition, a contractor is not supervised by BLM personnel. The contractor is fulfilling the terms of the contract and is responsible only to the contracting officer or designated

representative. This concept is valid whether the contractor is executing a full-service prescribed fire contract or assisting the BLM in the execution of a project, e.g., providing holding and/or mop up services. If a contractor is actively involved in igniting, holding or mopping up a BLM prescribed fire, a Contracting Officers Authorized Representative (COAR) or Project Inspector (PI) will be on the site (exceptions can be made for routine mop up and patrol) to ensure that the burn objectives are being met and that the terms of the contract are followed.

The BLM representative (COAR or PI) must have prescribed fire and/or wildland fire qualifications equal to what the BLM would require if a BLM Prescribed Fire Burn Boss were conducting the actual operations. This requires coordination with the Contracting Officer to insure that qualified personnel are designated as COARs and PIs.

Chapter 7: Cooperation and Assistance

A. Cooperation

Offices are encouraged to enter into cooperative agreements for the use of prescribed fire resources. Joint ecosystem-based prescribed fire management programs are encouraged to accomplish resource or landscape management objectives when consistent with land use plans. These partnerships are encouraged at both the programmatic and project levels to implement prescribed fire projects.

B. Other BLM Units and Other Federal Agencies

Assistance to other BLM units for fuels management activities may be provided without formal agreement. The assisting unit will use the prescribed fire number assigned by the host unit.

Coordination with other Federal agencies will occur in the planning phase for joint prescribed fire projects. The BLM may provide assistance for prescribed fire that will be conducted on lands administered by other Federal agencies. The Interagency Agreement for Fire Management (February 20, 1997) provided for interagency assistance without additional agreements. Assistance is initiated by the issuance of Task Orders that provide the project specifics. Fuels management, including prescribed fire, is specifically covered in the agreement. The agreement states that AAgencies may choose to bill by mutual agreement.@

Instruction Memorandum OF&A 2000-016 provides the following guidance.

The BLM process for interagency fuels management activities is similar to the process the BLM follows for assistance on wildland fires. The Bureau fully endorses the concept of interagency support and recognizes that well-planned and managed interagency activities should benefit all parties. Unlike emergency suppression activities, no office is obligated to provide fuels management assistance if it conflicts with BLM workload priorities and jeopardizes achieving BLM's performance measures.

1. All BLM interagency fuels management activities (prescribed fire, mechanical, chemical) involving 2823 funding must have:

a. An assigned fuels management project number. Assign one number per project where the cost must be tracked. Local offices may choose to assign one number per agency where there are numerous assists to a single local agency. A list of project numbers is assigned to each BLM Field Office. The project number enables financial tracking and the documentation of the project in the Fire Reporting System.

b. Documentation of each project in the Bureau's Fire Reporting System. The local BLM office that assigns the fuels project number is responsible for filing the Fire Report for the project. The Assistance Fire Report is easy to complete and requires no specific knowledge of the project or BLM's costs (See Chapter 9.)

2. The 1999 amendment to the master Interagency Agreement for Fire Management, which covers the BLM, BIA, FWS, NPS and USFS, addresses several items including reimbursement for fuels management activities. Section V, G, item 7, states:

> The Interior agencies have agreed to not reimburse for services rendered to one another under the Hazardous Fuel Reduction Operations program. Potential deficiencies in individual agency's Operations accounts due to assistance rendered will be covered by funding transfers following normal Department protocols. The Interior bureaus and the Forest Service also agree to not reimburse each other for Hazardous Fuel Reduction Operations assistance except for extraordinary situations in which there is no opportunity for reciprocal services to achieve performance targets. Reimbursement is acceptable only when the amount to be reimbursed represents a significant portion (greater than ten percent) of the office's allocation.

The phrase Aten percent of the office's allocation@ only applies to the Forest Service since the Interior agencies, through the master Interagency Agreement amendment and previous documents, have already agreed to not reimburse for any services regardless of cost. The reimbursement phrase refers to that portion of work beyond what has been offset through reciprocal services. It should also be noted that national caches run by the Forest Service have no allocated fuels funds. Therefore, they may choose to bill for all fuels management orders as they currently can for other non-suppression activities. In keeping with the intent of minimizing administrative costs, BLM offices should work with their Geographic Area's national cache. If managed by the Forest Service, see if an arrangement can be made, such as picking up the order as opposed to having it shipped, to eliminate billing. In general, the most efficient method of obtaining supplies for fuels activities is to work directly with local interagency neighbors.

3. When another Federal agency requests BLM assistance on a fuels management project, the request should go to the local BLM Field Office. The local BLM office assigns a fuels management project number that will be the only BLM number issued for that project regardless of where the BLM assistance is obtained. If the local BLM office provides all of the requested assistance, all activities are handled strictly between the two interagency neighbors. If only some, or no, local BLM assistance can be provided, it is the responsibility of the requesting agency to decide to continue to seek assistance from more distant sources. If BLM assistance is obtained from other sources, usually through the normal resource ordering process (similar to wildland fires), the original BLM project number assigned is the only one used. The fuels project number is only used to cover BLM costs. Each BLM office responding uses its own office designation code (e.g., OR-010) with the 2823 subactivity code, the program element AJM@ and the assigned project number given by the local BLM office. The costs of interagency assistance will not be considered part of any office's fuels management allocation.

By having a unique project number and the Fire Report, these costs can be tracked at the national level and budget adjustments among the agencies can be made, if necessary. For example, a Field Office has been allocated $100,000 in fuels funds (2823) to meet its program support and project implementation costs to accomplish that year's planned fuels management workload. If the office uses all of this allocation on their projects, plus an additional $8,000 for documented interagency assistance, they will not be considered over-expended for the additional $8,000. Because of the complexity that interagency assistance introduces into fund management, every office must promptly and accurately document expenditures and activities.

For those infrequent situations when an interagency partner does not request local services from the BLM and only wants radios from the national cache (which the BLM manages) or supplies from the Great Basin national cache (which the BLM manages), a unique fuels management number for each agency has been established at the National Interagency Coordination Center (NICC). This number will only be used by NICC for national cache items when no BLM Field Office number has been assigned.

4. Interagency assistance activities should not be used to expand the BLM's workforce numbers or extend the length of the BLM's workforce season more than one full pay period. The Bureau is still accountable to the 1,039-hour length-of-season limitation on seasonal employees. Assistance workloads must not be part of any consideration to convert seasonals to career seasonal (WAEs) or career seasonals to permanent full-time. Interagency assistance will also not be considered when assessing the local workload for the purpose of establishing a permanent, full-time fuels management position.

5. BLM units requiring assistance from other BLM units or other agencies outside of the local operating area should place orders through the normal resource ordering process. The use of BLM national resources is usually negotiated with the home unit and followed up with an order through the normal resource ordering process.

C. Private Individuals and Organizations

Agency Administrators should enter into agreements with private parties on intermingled lands when resource objectives can best be met through this approach. The agreements will specify the exact lands involved, the overall objectives, what actions will be taken by each party and how costs will be shared. The BLM has only very limited authority to expend public funds to provide benefits on private lands. Any expenditure on private land must have a clear benefit to biological resources on public land administered by the BLM. In most cases, the private landowner must fund a proportional share of the project cost. However, this does not need to be a monetary exchange. The private landowner(s) may provide services (e.g., line construction), equipment (e.g., engines, water tenders or bulldozers), supplies (e.g., fuel) or qualified personnel to fulfill their part of the obligation.

There may be occasions where a private landowner would allow the BLM to burn private land to facilitate a BLM project. For example, moving a perimeter to a road or natural barrier on private land may allow the BLM to avoid constructing a significant amount of fire line. In such cases, there is a clear benefit to the BLM and asking the private landowner to pay a share of the cost would not be appropriate.

D. Prescribed Fire Management Teams

Six Interagency Fire Use Teams are available to provide assistance in planning, developing and implementing the prescribed fire program. These seven-member teams include a Team Leader (Incident Commander), Operations Section Chief, Planning Section Chief, Logistics Section Chief, Prescribed Fire Behavior Analyst and two trainees. These teams, capable of providing technical assistance on complex prescribed fire projects as requested by the ordering unit, can be ordered through the normal dispatch system.

Local dispatch offices should forward orders to the appropriate geographical area coordinating center (GACC). For additional information, refer to the National Interagency Prescribed Fire Management Teams Operational Guide.

Chapter 8: Escaped Fires

A. Definition of Escaped Prescribed Fire

A prescribed fire becomes a wildland fire when the Prescribed Fire Burn Boss determines that an escape has occurred or is likely to occur. Fire outside of the planned perimeter, or outside any planned Allowable Areas, that cannot be contained with the holding forces identified in the Prescribed Fire Plan, is an escape and will be declared a wildland fire. This is not fire that crosses the fireline which can be contained by resources on-site (no suppression charges will be used). If fire suppression funds (2821) are used to contain a prescribed fire, it must be declared an escaped fire.

Some Prescribed Fire Plans identify Allowable Areas where a fire outside the planned perimeter will not be declared a wildland fire until it exceeds specified criteria, exceeds a stated target size or threatens the boundary of the Allowable Area. In such cases, an escape does not need to be declared until the criteria as stated in the Prescribed Fire Plan have been exceeded.

Once a prescribed fire becomes a wildland fire, it cannot be returned to prescribed fire status. For additional information, see Chapter 9 for fire reporting requirements and Chapter 6 for financial information.

After an escaped prescribed fire has been **CONTROLLED**, the Agency Administrator may elect to continue with the implementation of the original prescribed fire project. Appropriate adjustments must have been made to the Prescribed Fire Plan.

B. Escaped Prescribed Fire Actions

When a prescribed fire is declared a wildland fire, managers still have the full range of suppression options available under the concept of Appropriate Management Response. If a prescribed fire is declared a wildland fire, a Fire Number will be assigned and all suppression costs will be charged to the 2821 subactivity.

The following actions will be taken by designated staff on all BLM prescribed fires that escape and are declared wildland fires.

1. Notify the BLM Agency Administrator responsible for the area (RXB or FMO).

2. Take prompt and reasonable action to control and suppress the fire (IC). This should include development of a Wildland Fire Situation Analysis (FMO, IC, Agency Administrator) to determine the appropriate suppression action.

3. Notify any other Agency Administrators and/or landowners who may be affected (FMO, Resource Advisor, Dispatch). Coordinate suppression actions with the other affected parties (IC, FMO).

4. Document the time and environmental conditions that existed when the escape occurred (RXB, RXI, Holding Specialist, FEMO).

5. Document the incident, including all actions prior to and after the escape. Set up a

file that includes all pertinent information, i.e., a chronology of events including the prescribed fire report and unit logs or individual statements, the fire investigation report, weather forecasts including any spot forecasts, Remote Automated Weather Station (RAWS) data and National Fire Danger Rating System (NFDRS) data for the day of the escape from the nearest weather stations, photos and any appraisal of damages (RXB, FMO, IC).

Since all prescribed fires are planned management actions, an escape onto non-Federal lands may lead to tort claims and liability issues. The instructions contained in Manual 1386 should be followed. Special attention to documentation is critical.

C. Escaped Prescribed Fire Administrative Review

All escaped prescribed fires will receive an administrative review. The level and scope of the review will be determined by the injuries, damage, and cost associated with the escape. The goal of the escaped prescribed fire review process is to guide future program actions and minimize future resource damage by preventing future escapes from occurring. This is accomplished by gathering knowledge and insight for incorporation into future prescribed fire planning and operational procedures. Bureau Manual 1112 - Safety, Paragraph .22, outlines accident investigation procedures. The following guidelines apply to escaped prescribed fire reviews.

1. The objectives of the prescribed fire review are:

    a. To prevent future escapes from occurring.

    b. To establish accountability.

    c. To determine if the Prescribed Fire Plan was adequate for the project.

    d. To determine if the prescription, actions and procedures set forth in the Prescribed Fire Plan were followed.

    e. To determine the level of awareness and understanding of the personnel involved, with regard to procedures and guidance.

    f. To determine the extent of prescribed fire training and experience levels of personnel involved.

    g. To determine if overall policy, guidance and procedures relating to prescribed fire operations are adequate.

2. Responsibilities for prescribed fire administrative reviews are as follows:

    a. Fire Management Officer. The FMO is required to investigate all escaped prescribed fires, either personally or through an appropriate designated investigator.

b. Agency Administrator. The Agency Administrator is responsible for ensuring adequate and proper investigation of all escaped prescribed fires that result in minor personal injuries, burn onto private or other agency lands or require expenditures of up to $50,000 for suppression and/or damage to property.

The Agency Administrator may appoint an investigation team or request that one be appointed consistent with Manual Section 1112 - Safety, paragraph .22D, Accident Investigations.

The Agency Administrator will notify the SFMO and State Director of escaped prescribed fires. Copies of the completed review report will be sent to the State Director, SFMO, and the Director OF&A (FA-130).

c. State Director. State Directors are responsible for ensuring adequate, proper investigation of all prescribed fire escapes resulting in serious or multiple personal injuries, significant burned area on private or other agency lands or an estimated expenditure of $50,000 to $100,000 for suppression and/or property damage.

The State Director will notify the Director, Office of Fire and Aviation, of escaped prescribed fires meeting the above criteria within 24 hours. Copies of the completed review report will be sent to the Director OF&A (FA-130).

d. BLM Director (FA-100). The Director is responsible for ensuring adequate and proper investigation of all prescribed fire escapes resulting in fatality, injuries to people not involved in the prescribed fire operation, fire shelter deployment, a major transportation route closure, smoke significantly impacting a major population center or causing a public health concern, or where suppression expenditures and/or property damage will exceed $100,000.

3. The documentation required for a review are listed below. A review team will be provided with all of the **original** documents related to the incident.

a. Those items listed in Chapter 9, Section B, Items number 4 and 5.

b. The Prescribed Fire Plan and all attachments.

c. Documents pertaining to the qualifications and experience of the Prescribed Fire Burn Boss, Ignition Specialist, Holding Specialist, and other key overhead. This would include red cards, training and experience records and taskbooks.

d. Dispatch logs, radio logs, and any aviation records or logs.

Chapter 9: Reports

A. Individual Prescribed Fire Report

All prescribed fires will be assigned a Prescribed Fire Number and reported on the BLM Fire Reporting System. Reports must be entered into the system within two weeks (14 days) after completion of the project. A block of numbers has been issued by the National Office of Fire and Aviation for each reporting office.

Instructions for reporting prescribed fires are found at www.nifc.blm.gov.

Some unique entries will be required to allow the Bureau to capture the required data.

1. The acreage for the project requires two entries in the Statistical Data section of the report: the actual burned area (**Black Acres)**, or the actual acres treated for mechanical treatments; and the total project size (**Project Acres)**.

2. An entry for the Fire Behavior Prediction System (FBPS) fuel model is required.

3. An estimation of preburn fuel loading is required. Fuel loadings should have been determined, using a combination of experience, photo series and inventory prior to developing the Prescribed Fire Plan. As an alternative, standard fuel loadings of light, average or heavy may be selected.

4. A postburn estimation of the percentage of fuel consumed by the prescribed fire is also required. A combination of experience and inventory will provide an adequate level of information. As an alternative, a standard light, average or heavy fuel consumption may be selected. This will make it possible to estimate the emissions produced by each prescribed fire project, and allow for the accumulation of baseline data.

5. An entry must be made to identify the objective of the prescribed fire project. This entry should identify the overall objective of the project.

6. An additional entry must be made to identify the benefitting program(s). Up to seven entries can be made. However, the total acreage shown cannot exceed the total Black Acres for the entire project. The above information will allow the BLM to track accomplishments and costs and facilitate end-of-year reporting.

B. Escaped Prescribed Fire Reports

If a prescribed fire escapes and is declared a wildland fire, two fire reports are required. The acreage burned while the fire was considered a prescribed fire would be reported as prescribed fire acreage using the Prescribed Fire Number. Acreage burned after the fire was declared a wildland fire would be reported as wildfire acreage using the local Fire Number.

Instructions for both reports can be found at www.nifc.blm.gov/nsdu/fire_reporting/index.html.

C. Other Agency Assist Reports

Assist numbers are used to track funds spent to assist other agencies with prescribed fire or other fuels management projects. While Aoffset services@ or billing is not required when providing assistance, using an assist number provides the basis for the State Offices and the OF&A to determine if the Field Offices and State Offices are within their budget targets and allows the OF&A to track the total costs of assists to other agencies.

Assist prescribed fire numbers should only be used with the 2823 subactivity. Only one number per project is assigned. Local offices may choose to assign one number per agency where there are numerous assists to a single local agency, using the next available prescribed fire number from the block assigned to each office. (See Chapter 7, Section B.)

Do not do a fire report for assists to other BLM offices; use the prescribed fire number assigned by the host unit.

D. Other Activities

The Forest Ecosystem Health and Recovery Subactivity (5900) has been authorized to use prescribed fire numbers for the purpose of financial tracking. There are no fire reporting requirements for prescribed fire numbers issued to the 5900 subactivity.

Example of a
Preliminary Burn Site Review

Review Group

_____ Field Office:
_____ Location (w/map):
_____ Project name:
_____ Project number:

A. Management consideration

Land/resource planning documents:

Present management constraints:

BLM relationship w/operator:

Potential conflicts with other uses:

Smoke management/air quality issues:

(Consider location of communities, prevalent winds, smoke-sensitive air sheds, etc.)

Resource objectives:

1. _____
2. _____
3. _____
4. _____

B. Site Analysis

General site description:
Plant species and densities: Bare ground % _____ Litter depth:
Overstory: _____, _____,
Understory: _____, _____,
Topographic features: % Slope _____ Elevation:
Aspect:_____ Fuel description: Height:
Continuity: _____ Loading in tons/acre:
By size class:
Fuel profile adjacent to the planning unit:

C. Site Considerations

? Water quality ? Watershed? Water source ? Recreation
? Wildlife/T&E ? Wildlife/other ? Wilderness? Mining
? Archaeology ? Other

Land status/use conflicts: _____
Type of ignition: _____
Season to burn: _____
Barriers to fire: _____
Special equipment needed: _____
Preburn actions needed to meet fire behavior objectives: _____

D. Fire Organization (specify number of people needed):

Burn Manager _____ **Burn Boss** _____ **Firing crew**
Holding crew _____ **, Other**
Type and amount of equipment needed:

Duration of activity: Site preparation:
Implementation:
Postburn activities:

E. Logistics

Travel time to the site: _____
Preparation: _____
Camp/motel arrangements: _____

F. Recommendations

JOB PLANNING CHECKLIST

Field Office_____ **Project Name**
Project Number_____ **Subactivity**

Section I B Action required two years prior to AWP	Date	Initial
1. Prescribed fire project proposed to local Agency Administrator		
2. Local manager approves or denies further action and assigns the project to appropriate area staff person		
3. Site inspection. Map and initial flag project. Preliminary objective determined and discussed. Environmental concern identified and agreement mad that objectives can be met.		
4. Check and document: **a. Planning documents** **b. Land claims** **c. Mining claims** **d. Wilderness status** **e. Water rights status** **f. Possible threatened and endangered species conflict** **g. Possible conflicts with wildlife concerns** **h. Possible problems with soil, water quality or air quality** **i. Possible problems with livestock, wild horses or burros** **j. Possible conflicts with other authorized uses** **k. Possible conflict with other federal, state or local government agencies and public** ***Note: Indicate Conflict (C), Possible Conflict (PC), No Conflict (NC) or Not Applicable (NA). If a conflict or possible problem does exist, explain on a separate sheet or memo and attach**.		
5. Local manager reviews and resolves or initiates resolution of conflicts or terminates the proposal		
6. Prepare a prescribed fire project file. Include this checklist, full documentation of all items and best available map of the project area		
7. Initiate possible cooperative agreement and contributions. Prepare rough draft of cooperative agreement(s)		

Section II B Action required one year prior to AWP	Date	Initial
8. Visual contrast rating completed (Form 8400-4) and mitigated, if required		
9. Cultural resources/antiquities inventory completed and mitigated, if required		
10. Environmental analysis prepared, reviewed and signed		
11. Local manager reviews the mitigation identified in Environmental Assessment, Cultural Resource Report, Visual Resource Management and draft cooperative agreements and resolves or mitigates conflicts		
12. Prescribed Fire Plan prepared and approved		
13. Resource Advisory Council review		
14. Permission by private landowners for access, if needed.		
15. Cooperative agreements finalized and signed		
16. Office staff review and approval		
17. Public review and/or involvement of interest groups, tribal entities, user groups or individuals		
18. Final project layout		
20. Project submitted to Agency Administrator		
21. Final approval		
Section III - AWP and job completion		
22. Contracting draft prepared if this option selection: **a. Contract draft reviewed** **b. Contract advertised** **c. Bids reviewed** **d. Contract awarded** **e. Contract administration COAR and PI assigned. (These are the only personnel authorized to administer the contract)**		
23. Implementation of Prescribed Fire Plan.		
24. Conduct long-term monitoring of resource objectives		

Additional comments or information:

Prescribed Fire Plan Table of Contents

A= Attached AN= As needed

EXAMPLE OF A
Prescribed Fire Plan

Project name: _____ **Field Office**_____

Prepared by:_____ **Date:**_____

Reviewed by:_____ **Date:**_____
Fire Management Officer

Reviewed by:_____ **Date:**_____

Reviewed by:_____ **Date:**_____

Technical Review by:_____ **Date:**_____

The approved Prescribed Fire Plan constitutes a delegation of authority to burn. No one has the authority to burn without an approved plan or in a manner not in compliance with the approved plan. Actions taken in compliance with the approved Prescribed Fire Plan will be fully supported. Personnel will be held accountable for actions taken which are not in compliance with elements of the approved plan regarding execution in a safe and cost-effective manner. The complexity of this project is rated as:

HIGH _____ **MODERATE** _____ **LOW**_____

Estimated cost per acre: _____ **Funding source(s):**_____

EA number: _____ **RIPS number:**_____

Approved by:_____ **Date:**_____

Prescribed Fire Plan Technical Review

Field Office:	**EA Name:**
Project Name:	**EA Number:**

	FO Review	**Technical Review**
Supporting Analysis Document (NEPA) (OPTIONAL)		
Decision Document (ROD) (OPTIONAL)		
Prescribed Fire Plan Elements:		
Complexity Rating		
Cost Estimate		
Management Summary & Risk Analysis		
Resource Objectives, Fire Treatment Objectives, & Constraints		
Physical Description		
Map(s)		
Environmental Parameters & Prescribed Fire Prescription		
Fire Behavior, Including Calculations and Narrative		
Smoke Management Information		
Monitoring Information		
Public Information and Notifications		
Organization & Equipment List		
Air Operations Organization/Plan		
Ignition and Holding Plan		
Mop Up and Patrol Plan		
Escaped Fire Plan		
Job Hazard Analysis		
Public Safety Provisions		
Medical Plan		
Communication Plan		
Go/No GO Checklist		
Prescribed Fire Briefing Checklist		
Test Fire Provisions		

Cost Summary		

+ Adequate - Meets BLM Standards
o Adequate with Modification. See comments.
- Deficient

Comments:

Signature: _____ **Date:** _____

Title: _____

Office: _____

Management Summary and Risk Analysis

(Provide a brief summary of the project and potential impacts to the project area and surrounding areas. Specifically discuss public and firefighter safety. Include a summary of the risk, potential consequences and technical difficulty of the project. will identify potential consequences and . Identify any mitigating measures and other actions to be taken to reduce the complexity. Specifically identify any unmitigated risks or issues.)

Project Objectives

Resource objectives	Fire treatment objectives

Tolerable Deviation of Objectives

Constraints

Physical Description

Legal description: **Latitude/Longitude:**

Size: **Ownership:**

County:

Elevation: Top: **Bottom:** **Aspect:** **Slope %:**

Drainage:

General description of the site:

Attach area and project maps.

Description of Fuels

Fuels description: Natural: **Activity:**

Photo series and code(s): GTR: **Code:**

Fuel model(s): NFDRS **FBPS**

Size class tons per acre -- Total dead: **Duff depth:** **Continuity:**

0 to ."1 **Shrubs:** **Surface fuel depth:**

1" to 3 **Herbaceous:**

3" to 9" **Total fuel loading (live and dead):**

9" to 20"

20" +

General description of fuels adjacent to the project area:

Environmental Parameters

				Outside area at critical holding point
	(Low end)	(High end)	(Desired or absolute)	
Temperature				
Relative humidity				
Wind speed (mid frame)				
Slope				
Wind direction				
1-hour fuel moisture				
10-hour fuel moisture				
1,000-hour fuel moisture *				

Prescribed Fire Prescription

	Acceptable range			Outside area at critical holding point
	(Low end)	(High end)	(Desired or absolute)	
Fuel model(s)				
Rate of spread B chains per hour				
Flame length (in feet)				
Live fuel moisture - % *				
Duff moisture - % *				
Soil moisture - % *				
Scorch height (in feet) *				
Probability of ignition - %				
Spotting distance (in miles)				

*** If applicable**

Fire Behavior Narrative

(The fire behavior narrative should describe the fire behavior identified in the prescription and discuss how it will achieve the desired treatment objectives. It will be necessary to discuss fire behavior in terms of firing patterns and techniques.)

Scheduling

Season: **Approximate date:** **Time of day:**

Limitation on season or days of week for burning:

Length of ignition phase: **Length of burnout phase:**

Smoke Management

Smoke management number (if required):

Distance and direction from smoke-sensitive area(s):

Visibility hazard(s) (i.e., roads, airports, etc.):

Mitigating measures or actions to reduce visibility hazard(s):

Necessary transport wind direction and/or special constraint(s)/consideration(s):

Minimum meteorological conditions (dispersion day):

Will smoke monitoring be required for this project? Yes _____ No_____

Describe how and when smoke monitoring will be accomplished:

Can residual smoke be a problem?

Contingency plan for unanticipated smoke impacts:

Monitoring Plan

(The minimum monitoring requirements established for individual prescribed fire projects include weather during the fire, observed fire behavior and whether fire treatment objectives have been met. If slowly changing fuel moisture values, such as live fuel, 1000 hr. fuels or soil moisture, are included in the prescription, actual values should also be documented.)

See Appendix 4 for a basic monitoring form.

Public Information

Public information -- what, when, by whom:

Notifications

Preburn and burn contacts -- when, by whom:

Who To notify	Phone numbers	When to notify	Who will make the notification

Organization and Equipment List

Prescribed Fire Burn Boss: **Resource Advisor:**
Ignition Specialist: **Holding Specialist:**

		Amount supplied by:	
Personnel	**Total amount**	**BLM**	**Other**
Equipment			
Ignition equipment			
Engines			
Water tenders/other			
Fittings/hose/etc.			
Pumps and accessories			
Other (radios, belt weather kits, etc.)			

If aerial firing is planned, develop a Air Operation Organization and Plan and attach it to the Prescribed Fire Plan.

Ignition and Holding

Preburn work:

Ignition plan:

Potential holding problems:

Location of holding forces and instructions:

Water sources:

Action plan for slopovers:

Other:

Mop Up and Patrol Plan

(The mop up and patrol plan should outline the procedures to be implemented between the time the ignition is completed and the time the unit is declared out. A detailed description of the mop up and patrol procedures should be noted in this section.)

Daily Mop-Up Shift Plan

Burn date: **Shift plan date:**

Predicted weather next 24 hours		
	Minimum	**Maximum**
Temperature		
Relative humidity		
Wind speed (at 20 feet)		
Wind direction		

Weather trend narrative:

Shift plan objective:

Special considerations and hazards:

Mop up IC: **Patrol Coordinator:**

		Amount supplied by:	
Personnel	**Total amount**	**BLM**	**Other**
Equipment			
Engines			
Hose			
Pumps			
OTHER			

Add extra pages as needed.
Attach weather forecast.

Escaped Fire Plan

This page describes the action(s) to be taken should an escape occur.

1. Decision: Who will make the decision that the fire has escaped? Identify trigger points (if any) at which the fire will be declared an escape.

1A.Organization: Identify who will be the IC.

2. Notifications: Identify the notifications to be made and who will make them.

3. Containment strategy: Describe the containment strategy.

4. Containment opportunities: Identify any known containment opportunities.

5. Resource ordering: Identify the dispatch center responsible for resource ordering.

Public Safety Provisions

Notifications:

Signing:

Other:
(Road or trail closures)

Medical Plan

EMTs	Location	Equipment	
		Yes	No

* Identify any on-site EMTs and First Responders

Transportation (Identify ambulance services and ALife Flights@)

Name	Telephone	Address	Paramedics	
			Yes	No

Hospitals

Name	Address	Travel time		Phone	Helipad		Burn center	
		Air	Ground		Yes	No	Yes	No

* Identify the longitude and latitude for hospitals with helipads. Also list hospital radio frequencies.

Medical Emergency Procedures

Notify the Prescribed Fire Burn Boss of serious accidents or injuries. The Prescribed Fire Burn Boss will initiate on-site response and coordinate additional needs through_____. The first option is to transport to _____. If using an ambulance for transport, send someone to meet the ambulance at a known location, i.e., highway junction or known landmark.

Prescribed Fire Communications Plan

Radio information:

System/cache	Channel	Function	Frequency	Assignment	Remarks
					H = Handheld M = Mobile

* If aerial ignition is used, assign a specific radio frequency for use between the aircraft and Prescribed Fire Burn Boss and/or Ignition Specialist.

Phone information:

Name	Number

Go/No-Go Checklist

A. Has the burn unit experienced unusual drought conditions or contain above normal fuel loadings which were not considered in the prescription development? If NO go to item 1., If YES go to item B.	**Yes**	**No**
B. If YES have appropriate changes been made to the Ignition and Holding plan and the Mop Up an Patrol plans? If YES go to item 1., if NO STOP.		

A "No" response to any item below means STOP!

1. Are ALL fire prescription specifications met?	**Yes**	**No**
2. Are ALL smoke management prescription specifications met and/or has smoke management clearance been given for the project?		
3. Has an area spot weather forecast been obtained? Is it favorable?		
4. Are ALL personnel required in the Prescribed Fire Plan on site?		
5. Is ALL equipment required in the prescribed Fire Plan in place and functional?		
6. Have ALL personnel been briefed on the project objectives and their assignments?		
7. Has ALL the preburn preparation work been completed?		
8. Have ALL personnel been briefed on the safety hazards, escape routes and safety zones?		
9. Have ALL the required notifications been made?		
10. Are the on-site resources adequate for containment under the expected conditions?		
11. In your opinion, can the burn be carried out according to plan and will it meet the planned objectives?		

If ALL of the above questions were answered AYES,@ proceed with the project briefing and test fire. Document the conditions, location and results.

Concurrence: _____ Signed:
(Prescribed Fire Ignition Specialist) (Prescribed Fire Burn Boss)

Concurrence: _____ Date:
(Prescribed Fire Holding Specialist)

Prescribed Fire Briefing Checklist

Unit name/number:

Chain of command:

Objectives:

Communications:

Firing/holding assignments:

Escaped fire plan:

Weather forecast:

Safety:

Public safety:

JHA
Known hazards
LCES
Medical plan
Other

Special features and sensitive areas

Other considerations and notes on the briefing:

Signed:_____
(Prescribed Fire Burn Boss)

Date:_____

Test Fire

Location:

Date and time:

Fuels:

Weather conditions:

Results (Note the flame length and rate of spread):

The test fire meets the prescription parameters: YES ____ NO

Signed:_____
(Prescribed Fire Burn Boss)

Date:_____

Proposed Total Cost

Planning:
- **EA**
- **Clearances**
- **Plan preparation**

Site Preparation:

Ignition + holding:

Mop up and patrol:

Other:

Supplies and equipment:

Specify the funding sources and amounts.

Prescribed Fire Report

Burning unit: **Date(s):**

Date of burn(s): **Time of burn(s):**

Temperature: **Relative humidity:** **Wind speed:** **Direction:**

Fuels present after burning: **Estimated:** **Measured:**

Achievement of fire treatment objectives

Short-term results:

Prescribed Fire Boss comments (fire behavior, personnel and equipment performance, changes for the next operational period, and future recommendations, etc.)

Signed: _____
(Prescribed Fire Burn Boss)

Date: _____

Attach copies of the General and Spot Weather Forecasts.
Attach on-site weather and fire behavior observations.
Attach any available maps and photos.

Weather +

Fire Behavior Observation Sheet

Observer's name: _____ **Date:** _____

Prescribed fire identification:

Location identification:

Weather + fuel moisture

Time						
Slope (%)						
Aspect						
Elevation (in feet)						
Fuel model (1-13)						
Shade percent (estimate)						
Dry Bulb temperature						
Wet Bulb temperature						
Relative humidity (%)						
Eye-level wind speed						
Wind direction						
1-hour fuel moisture -- Open (%)						
1-hour fuel moisture -- Shade (%)						
Fire observations						
Average flame length (in feet)						
Maximum flame length (in feet)						
Overstory torching/crowning (yes/no)						
Fire whirls (yes/no)						
Spotting occurrence (yes/no)						
Spotting distance (in feet)						
Rate of spread (chains per hour or feet per minute)						
Smoke drift direction						

Other information:

1,000-hour fuel moisture: _____ **Duff moisture:** _____ **Soil moisture:** _____

Live fuel moisture: _____

Example of a

Job Hazard Analysis (JHA) for prescribed fire operations

X = this project	Activity	Hazards	Action to eliminate hazard
	1. Driving to work site	A. General operations and public traffic	A. Defensive driving techniques
		B. Steep, narrow roads	B. Drive cautiously to ensure less than half the usual stopping distance. Lights on.
		C. Unsecured loads	C. Check loads for secureness before departing - use tie downs.
		D. Hauling flammable substances.	D. Use appropriate containers for hauling slash fuel or gasoline.
		E. Transporting sharp tools	E. Use guards, cages, boxes or tool mounts.
		F. Loading vehicles	F. Use proper lifting techniques.
		G.	G.
		H.	H.
	2. Driving at or near work site	A. Backing or turning around in small areas	A. Use spotters. Face the hazard while turning around. Avoid tight turnaround if possible.
		B. Heavy truck traffic between units and water source	B. Maintain radio communications and alert other drivers in the area. Lights on.
		C. Smoke, poor visibility	C. Place a guide on foot ahead of the vehicle. Wait until smoke is less dense. Lights on. Use light bars and/or warning lights.
		D. Parking near a prescribed burn.	D. Use parking brake. Leave keys in ignition, avoid leaving exposed flammable in bed of vehicle. Close all windows.
		E. ATVs	E. Operated by trained and licensed drivers only. Lights on. Avoid steep slopes.
		F. Public safety	F. Post signs and/or use roadblocks if needed.
		G.	
	3. Handling flammable material	A. Exposure to sparks	A. Use proper containers, move away from hot areas, no smoking.
		B. Eye or skin contamination from fuel	B. Gloves, goggles, leather lace-up boots
		C. Leaking containers or torches	C. Empty and tag in field, have repairs made before next use.
		D. Improper gas/diesel ratios for slash fuel	D. Clearly label all containers, field test small amounts before use.
		E. Slippery surfaces from spilled fuel	E. Make every effort to avoid spilling fuel, Install nonslip material on fuel truck beds. Clean up spills as soon as possible.

	4. Equipment set-up	**A. Muscle or back strain lifting heavy objects**	**A. Use proper lifting techniques; get help if too heavy.**
		B. Operating pumps and mechanized equipment exhaust burns, loose clothing	**B. Tuck in shirt tails, remove scarfs and jewelry. Wear proper clothing, gloves and boots.**
		C. Application of slippery retardant, poor footing	**C. Wear eight-inch lug-soled, lace-up boots. Avoid slick areas if possible.**
		D. Crew people working uphill from each other (rolling debris)	**D. Post lookout. Shout warnings.**
		E. Operating high pressure nozzles.	**E. Maintain visual contact with pump operator and other crew members. Use backup person behind nozzle man. Use goggles.**
		F. Traversing rocky terrain	**F. Wear eight-inch lug-soled boots. Move slowly, cautiously.**
		G. Noise from pumps and saws	**G. Use hearing protection (ear plugs or muffs).**
		H.	
	5. Firing (hand ignition)	**A. Rolling debris**	**A. Use handheld radios, close supervision, lookouts. Consider aerial ignition.**
		B. Proximity to intense heat and erratic fire behavior	**B. Same action as in A; use PPE.**
		C. Smoke, sparks and cinders	**C. Avoid very dense smoke; wear PPE; rotate personnel out of worst areas.**
		D. Poor footing, steep slopes, heavy fuels	**D. Constant awareness; learn to identify hazard areas; slow down.**
		E. Noise of fire obscures verbal warnings	**E. Hand held radios for all lighting personnel.**
		F. Burning fuel dripping from torches. Burns from drip torches	**F. Lighters stay alert to location of torch flame. Close air vent when not actually lighting. Wear proper PPE.**
		G. Misguided lighter lighting wrong area.	**G. Know location of others. Radios for all lighting personnel. Close supervision.**
		H.	**H.**
	5.1 IGNITION DEVICES		
	5.1.1 Flares	**A. Risks associated with firing projectiles or flares**	**A. Follow basic firearm safety rules; separate ammo by type and size, limit launcher access to trained personnel or those undergoing training.**
		B. Activity outside project boundaries due to inadvertent firing over/under shot	**B. Post lookouts. Notify Ignition Specialist and Holding Specialist. Holding crews extinguish spot subsequent to further ignition.**
	5.1.2 Mechanical (ATV)	**A. Vehicle maintenance**	**A. Thoroughly inspect vehicles and ignition equipment.**
		B. Proximity to fire, intense heat, erratic behavior	**B. Same as in 5.B; know escape routes.**

		C. Rough terrain, heavy ground fuels, side hills and slopes	**C. Scout and locate accessible routes; make dry run, use experienced operator or supervised trainee. Fire by hand if needed.**
		D. Noise of ATV and fire obscures verbal warnings	**D. Handheld radios required of all ignition personnel. Hard hats instead of helmets to facilitate communications.**
		E. Inadvertent ignitions	**E. Preplan ignition on/off points; check wand apparatus regularly. Notify holding crew.**
		F.	**F.**
	5.1.3 Mounted (terra torch)	**A. Intrinsic danger of using terra torch (vehicle mounted)**	**A. Terra torch use supervised by Ignition Specialist. Use only with trained operators, i.e., driver, operator and engine support.**
		B. Vehicle maintenance	**B. Thoroughly inspect vehicle and ignition equipment. Ensure all electrical connections and grounds in working order.**
		C. Proximity to fire, intense heat, erratic behavior	**C. Same as 5.B; known escape routes.**
		D. Rough terrain/roads, ground fuels, side hills and slopes	**D. Terra torch use restricted to roads or two tracks, pre-scouted paths or routes only.**
		E. Chemical exposure, mixing/transferring	**E. Trained personnel only. Well-ventilated area. Use PPE. All containers grounded.**
		F. Flammable vapors, liquids and solids.	**F. Terra torch mixing group will wear 100% cotton clothing. All containers grounded. Clean up all spills.**
		G. Slippery surfaces from spilled fuel	**G. Avoid spilling fuel, install nonslip deck material, use absorbent material in torch kit.**
		H.	
	6. Holding (incl. all of item 4)	**A. Carrying sharp tools**	**A. Keep tool guards on while traveling; remove only while in use.**
		B. Tool use	**B. Proper crew training, with close supervision by crew boss.**
		C. Snag falling	**C. Falling and bucking to be done only by trained personnel.**
		D. Burned off snags or widow-makers	**D. Avoid entering burned-over areas. Post lookout; flag. Obtain professional faller if needed.**
		E. Burns from radiant heat and hot embers	**E. Nomex clothing, hard hats and gloves required.**
		F. Rolling debris	**F. Post lookouts; brief crew on potential hazard areas.**
		G. Erratic fire behavior	**G. To be covered by Burn Boss in preburn briefing; all shall know escape routes.**
	7. Mop-up (incl. all hazards in Items 4, 5, 6	**A. Slippery, wet surfaces**	**A. All PPE required; lug-soled, lace-up boots.**

		B. Smoke inhalation	**B. Rotate crews in and out of dense smoke.**
		C. Fatigue, long hours of work	**C. Duty shifts shall not exceed 12 hours, except in emergencies. Crews will work no longer than seven days on with one day off or 14 on with two off. Work in pairs; have rested drivers available.**

Example of an

Alternate Complexity Rating Format

Complexity elements:

1. Potential for Escape

Risk	Potential consequence	Technical difficulty

Rationale:

2. The Number and Dependency of Activities

Risk	Potential consequence	Technical difficulty

Rationale:

3. Values at Risk

Risk	Potential consequence	Technical difficulty

Rationale:

4. Fuels/Fire Behavior

Risk	Potential consequence	Technical difficulty

Rationale:

5. Size of Prescribed Fire Team

Risk	Potential consequence	Technical difficulty

Rationale:

6. Magnitude of Oversight/Political Activities

Risk	Potential consequence	Technical difficulty

Rationale:

7. Fire Treatment Objectives

Risk	Potential Consequence	Technical Difficulty

Rationale:

8. Environmental Constraints

Risk	Potential consequence	Technical difficulty

Rationale:

9. Safety

Risk	Potential consequence	Technical difficulty

Rationale:

10. Ignition Procedures/Methods

Risk	Potential consequence	Technical difficulty

Rationale:

11. Interagency Problems

Risk	Potential consequence	Technical difficulty

Rationale:

12. Project Logistics

Risk	Potential consequence	Technical difficulty

Rationale:

Factor	Complexity		
	Low	Moderate	High
Location and access			
Personnel			
Duration (continued logistical support)			
Special logistical function position assigned			

13. Special Features Inside Fire Area

Risk	Potential consequences	Technical difficulty

Rationale:

14. Smoke Management

Risk	Potential consequences	Technical difficulty

Rationale:

15. Other (Add other elements as needed.)

Complexity Elements Summation

Element	Risk	Potential consequences	Technical difficulty
1. Potential for escape			
2. The number and dependency of activities			
3. Values at risk			
4. Fuels and fire behavior			
5. Size of prescribed fire team			
6. Magnitude of oversight/ political activities			
7. Fire treatment objectives			
8. Environmental constraints			
9. Safety			
10. Ignition procedures/methods			
11. Interagency problems			
12. Project logistics			
13. Special features inside fire area			
14. Smoke management			
15. Other			
Summary for each column.			

Summary Project Rating

Rationale:

Allowed By: _____ **Date:**

Agency Administrator

Monitoring Information

Introduction

This section discusses methods for monitoring the conditions and characteristics of the prescribed fire treatment and the treatment objectives. The monitoring documents the weather and moisture conditions associated with the fire; determines whether the fire is remaining within the range of prescribed fire behavior; assesses whether prescribed fire project objectives are met and measures the effectiveness of the fire prescription in obtaining the desired fire treatment. Evaluation of monitoring data can lead to modifications in fire prescriptions, ignition and treatment objectives.

Information in this section will be presented in three parts. The Preburn section describes inventory and monitoring elements and activities that occur before the prescribed fire. The During the Burn section discusses monitoring of burning conditions and the fire itself. Postburn data collection is discussed in the Postburn section. More specific details about the monitoring techniques discussed here can be found in Miller (1994)[01].

1. Sample size: Sampling is the process of collecting samples from which an estimate is made of the characteristics of the entire population. For example, to determine what percentage of individual plants of a target species survived in a prescribed fire area, estimates of survival are made on individual plots. The number of samples collected determines how accurately the sample represents the actual plant survival. Managers decide how much error they can accept in the sample estimate, and how certain they would like to be that the estimate is correct. Using this information, and an estimate of the variability in the population, the number of samples to collect can be determined.

It is important to sample correctly, because incorrect conclusions may be drawn from inadequate data. A manager may not be able to detect a change that occurred after a prescribed fire, or may think that a prescribed fire did not achieve the desired effect when it actually did occur. With inadequate sampling, a manager may burn when a key element such as live fuel or duff moisture is not within the prescribed limits and have undesired fire behavior or unacceptable fire effects. An excellent discussion of the basic principles of sampling can be found in Elzinga and others (1998)[02]. A simple procedure for determining sample size can be found in Norum and Miller (1982)[03].

2. Organization: This section provides guidance for collecting data related to weather, fuel moisture and the achievement of fire treatment objectives. Treatment objectives are generally expressed in terms of plant mortality, plant injury such as crown scorch, fuel consumption and burn pattern. Means of collecting information are briefly discussed and detailed sources of information are referenced.

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[0]1. Miller, Melanie. 1994. Fire Effects Guide. PMS 481. National Wildfire Coordinating Group. National Interagency Fire Center. Boise, ID. (Publications Management System, NFES 2394).

[0]2. Elzinga, Caryl L., Daniel W. Salzler, and John W. Willoughby. 1998. Measuring and monitoring plant populations. BLM Technical Reference 1730-1. Printed Materials Distribution Center. National Business Center. Denver, CO. 476 p.

[0]3. Norum, Rodney, and Melanie Miller. 1984. Measuring fuel moisture content in Alaska: Standard methods and procedures. USDA For. Serv. Gen. Tech. Rep. PNW-171. Pacif. Northw. For. and Range Exp. Sta., Portland, OR. 34 p. Publications Management System, NFES 2127.)

Information in this section will be presented in three parts. The Preburn section describes inventory and monitoring elements and activities that occur before the prescribed fire. The During the Fire section discusses monitoring of burning conditions and the fire itself. Postburn data collection is discussed in the Postburn section. More specific details about the monitoring techniques discussed here can be found in Miller (1994)[04] and in other cited references**.**

Preburn

1. Fuels information: The type and amount of fuels inventory depends on how much information is required for developing the prescription and evaluating the fire treatment. Fuels data are gathered to obtain information that can be used for prescription development.

Information can range from a fairly cursory assessment needed to determine which fire behavior fuel model applies to much more detailed information required to monitor specific fuels reduction objectives. The amount and type of fuels information required to set and evaluate a fuels reduction objective is set by the parameters detailed in the objective, and the accuracy and precision required.

a. Fuel loading. Specific techniques have been developed for inventorying or estimating living and dead biomass in forest and rangeland vegetation types. Sampling during the specific time of year when a prescribed fire is planned to occur is critical if grasses or forbs are an important part of the fuel complex. Timing is not as critical if only dead fuels will influence fire behavior. The following are some commonly used methods for determining fuel loading.

1) Fuel model assessment. A fuel model can be selected from the standard guide (Anderson 1982)[05].

2) Photo-series. Series of photographs show different levels of fuel in stands of selected vegetation types, and include fuel inventory data. Seven photo series are available for natural and activity fuels, including two new stereo photo series for Pacific Northwest mixed-conifer, western juniper, sagebrush and grassland types (Ottmar and others 1998)[06]; and for black and white spruce types of Alaska (Ottmar and Vihnanek 1998) [07].

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[0]4. Miller, Melanie. 1994. Fire Effects Guide. PMS 481. National Wildfire Coordinating Group. National Interagency Fire Center. Boise, ID. (Publications Management System, NFES 2394).
[0]

5. Anderson, Hal A. 1982. Aids to determining fuel models for estimating fire behavior. USDA For. Serv. Gen. Tech. Rep. INT-122. Intermt. For. and Range Exp. Sta. Ogden, UT. 19 p. (Publications Management System, NFES 1574.)

[0]6. Ottmar, Roger D., Robert E. Vihnanek, and Clinton S. Wright. 1998. Stereo photo series for quantifying natural fuels. Volume 1: Mixed-conifer with mortality, western juniper, sagebrush, and grassland types in the interior Pacific Northwest. PMS 830. National Wildfire Coordinating Group, National Interagency Fire Center. Boise, ID. (Publications Management System, NFES 2580.)

[0]7. Ottmar, Roger D. and Robert E. Vihnanek. 1998. Stereo photo series for quantifying natural fuels. Volume II: Black spruce and white spruce types in Alaska. PMS 831. National Wildfire Coordinating Group. National Interagency Fire Center. Boise, ID. (Publication Management System, NFES 2581).

3) Clipping and weighing. The estimation of pounds-per-acre of live herbaceous fuels is commonly obtained by clipping and weighing. These techniques, commonly practiced by range staff, will not be discussed here.

4) Forest fuel inventory. Forest vegetation and fuels have been divided into the following categories: standing trees, shrubs, herbaceous vegetation (grasses and forbs), forest floor litter, forest floor duff and downed woody material. Standard techniques for their inventory are outlined in Brown (1982)[08].

b. Fuel distribution. An assessment of fuel distribution is valuable for prediction of both fire behavior and effects. Significant variation in the amount and distribution of carrier fuels will affect fire behavior and may require adjustment in ignition. The presence of localized, large concentrations of fuel should be noted and considered when establishing the fire prescription, as these are a potential source of extreme amounts of heat, potentially damaging to vegetation and soil.

If fuel conditions are markedly different inside and outside of the prescribed fire area, such as on a slash unit, it may be desirable to obtain fuels information in the adjacent area for purposes of assessing fire potential and expected fire behavior.

c. Fuel moisture. Fuel moisture is defined as the ratio of the weight of water contained in a particular sample of fuel to its oven dry weight, expressed as a percentage. Baseline information on general patterns of seasonal moisture in live and dead fuels may be required to determine the timing and prescription for a prescribed fire. Sampling moisture contents of slowly drying fuels may be necessary to establish whether the prescribed conditions are being approached.

Fuel moisture both inside and outside of the burn unit should be monitored if the fuel complexes are significantly different. Materials such as large-diameter dead woody fuel, duff, soil and live fuels need only be sampled every two weeks, unless a significant rainfall event occurs. The number of samples required to accurately estimate fuel moisture is determined by the accuracy and confidence that the user desires. One sample is never adequate (see Norum and Miller (1982) for a detailed example and data sheets for determining the number of fuel moisture samples to collect).

Various methods exist for estimating fuel moisture. By far the best method is collecting fuel samples and processing them by oven drying. Although fuel sticks that estimate 10-hour moisture are commonly available, they are intended for use only in fire danger assessment. They are not a good analog for 1/4-to one-inch fuels; using their value in fire behavior projections can lead to inaccurate prediction.

[0]8. Brown, James K., Rick D. Oberheu, and Cameron M. Johnston. 1982. Handbook for inventorying surface fuels and biomass in the interior West. USDA For. Serv. Gen. Tech. Rep. INT-129. Intermt. For. and Range Exp. Sta., Ogden, UT. 48 p. (Publication Management System, NFES 2125).

Moisture meters work only for dead fuels and must be calibrated against true values obtained from the oven drying method. Fuel moisture theory and sampling procedures for dead and live fuels are discussed in the NWCG Fire Effects Guide, Chapter II and, in greater detail, in Norum and Miller (1982) (see footnote 2) and in Countryman and Dean (1979)[09].

2. Weather: If seasonal and diurnal weather are not known for a prescribed fire site, it may be valuable to obtain this information by monitoring at least one year ahead of the planned prescribed fire(s). Monitoring of weather conditions such as maximum temperature and minimum relative humidity, time of evening when the air temperature drops and humidity increases, and the amount and direction of terrain-influenced winds will establish the time of day when weather parameters are met. A nearby Remote Automated Weather Station (RAWS) may be adequate to obtain this information.

Depending on the amount and type of weather data needed, weather collection equipment may be installed in the year previous to the prescribed fire, or in the months or weeks before the fire is scheduled to occur. To develop a short-term climatology for a burn site, establish a weather station four to six weeks prior to the fire with a minimum of five to 10 days prior to ignition. Type 3 RAWS (portable) are ideal for this purpose. These may be radio- or telephone-activated and/or satellite-linked, and are available through the resource ordering system.

Detailed information on both establishment and operation of manual and automatic weather stations is contained in the Weather station handbook: An interagency guide for wildland managers.[011]

3. Photography: Photographic documentation should be a routine part of all monitoring projects. A specific schedule for taking photos should be established, such as during the growing season before the fire, immediately before the fire, immediately after the fire, at the end of the first postburn growing season and at designated yearly intervals. Using 35-mm slide film generally records more detail than print film, and prints can be made if necessary. Digital cameras allow quick reporting and communication of monitoring results.

The monitoring record should document the type of camera, lens, lens focal length and film used to take preburn photos. If possible, the same camera, lens, and film should be used for the postburn photos. An excellent discussion of the use of photo points and photo plots can be found in Elzinga and others (1998). Photography in the years after the fire should be coordinated and scheduled with resources staff.

a. Photo points. Photo points record landscapes and plant community features. Photo points provide a visual record of fire's impact on a site and allow comparison among years. They are the minimum monitoring level for treatment objectives that should be

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[0]9. Countryman, Clive M. and William M. Dean. 1979. Measuring moisture content in living chaparral: A field user's manual. USDA For. Serv. Gen. Tech. Rep. PSW-36. Pacif. Southw. For. and Range Exp. Sta., Berkeley, CA. 27 p. (Publications Management System, NFES 2142).

[0]10. Finklin, A. I. and W. C. Fisher, 1990. Weather station handbook: An interagency guide for wildland managers. PMS 426-1. National Wildfire Coordinating Group. National Interagency Fire Center. Boise, ID. 237 pp. (Publications Management System, NFES 1140 - with binder; NFES 2140 - paperback).

done. The point of origin, compass direction and angle of each photo point view must be recorded to be accurately replicated.

b. Photo plots. Photo plots are photographs of a defined small measurement area, often the vegetation measurement plot. They are the size of the photographic frame or slightly smaller, taken from above at a specified height. Each plot number should be recorded in the image.

4. Measures of plant mortality or injury:

a. Density. Density is a vegetation attribute that can be used to assess plant mortality relative to a fire treatment objective. The objectives of a prescribed burn could be to burn at least 80 percent of the area of a mountain big sage community and have no more than 10 percent mortality of bunchgrass plants. Mortality of species that have the potential to resprout is most easily assessed at the beginning of the next growing season.

b. Staked plants. Much valuable information on plant mortality and vegetative response can be obtained from permanently staked plants. The intent of staking plants is to provide a record of the individual fuel situation in which a plant exists, the amount of damage inflicted upon that plant by the fire, and the type of recovery which the plant does or does not make. Plants can be marked with a metal stake placed far enough away to not have an influence on the heat that the plant receives from the fire. Wide-mouth canning jar lids, held in place with a bridge spike and numbered with high temperature paint also provide useful markers. Plants should be located, marked and mapped in the days or weeks before the burn. GPS coordinates can make it much easier to relocate marked plants.

Staked plants can be randomly chosen or specifically selected. Selecting individual large trees of certain size classes can be appropriate if only a limited number are present. Random sampling is more appropriate when there are many individuals from which to choose. See Elzinga and others (1998) for a discussion of sampling design.

Monitoring equipment:

a. Fire behavior and characteristics. Before the burn, equipment needs to be installed for monitoring rates of fire spread and flame length, such as reference stakes, and for estimating depth of burn (duff consumption), such as duff spikes or surveyors pins. (See NWCG

Fire Effects Guide, Page II-27 for an illustration.) Soil temperatures are most easily monitored using tile or mica chips covered with heat-sensitive paints that are placed at the duff or soil surface and at various depths[011]. Duff spikes and soil temperature markers are best installed along a grid, or in association with tagged trees or plants. Locations of these devices should be recorded before the fire, because ash layers can make them difficult to relocate. Techniques for using this equipment are described in the NWCG Fire Effects Guide, Chapters II.D. and V.D.

b. Air quality. Local and state air quality officials must be consulted during

[0]11. Heat-sensitive paints are described on the web at http://www.telatemp.com/Thermo.htm

the prescribed fire planning process to determine their monitoring requirements, and to obtain assistance in locating and installing any equipment required for air quality monitoring, such as nepholometers and filter samplers. (See NWCG Fire Effects Guide, Chapter IV.2.)

6. Sensitive features: Features such as wildlife trees, archaeological sites, cabins, populations of sensitive plants, nesting habitat or other special features are identified before the fire so their protection can be integrated into the burn plan. Actions taken can include flagging so that disturbance from suppression actions can be avoided; preventing sites from burning; or applying fire in a highly controlled way at specified sites. Some of these actions may occur days or weeks before the fire, such as building handline or removing adjacent fuel concentrations, or just before ignition, such as applying fire suppressant foam.

During the Burn

Fire behavior and location of the fire front are monitored during ignition. Fire weather should be monitored not only during the ignition phase, but for the entire length of time during which fire remains in the unit. Throughout the prescribed fire, comparisons must be made of predicted and observed fire behavior. Any deviation from the fire behavior limits established in the prescription must be reported to the Burn Boss.

1. Weather:

a. Spot weather forecast. A spot weather forecast shall be obtained**.**

b. Smoke dispersal forecast. In areas where prescribed fire smoke is a sensitive issue, a smoke dispersal forecast can help determine whether ignition is appropriate.

c. Weather observations. A fire behavior and weather observations data sheet (Appendix 4) must be completed for each prescribed fire. A standard set of weather observations should be taken every 30 minutes during the ignition phase and hourly during the operational period. Observations shall include temperature, relative humidity, windspeed and direction, cloud cover, indicators of atmospheric instability and the presence of thunderstorms.

2. Fire behavior and characteristics: Methods for the following elements are discussed in the NWCG Fire Effects Guide, Chapter II.D.

a. Rate of spread
   1) Referenced observations

   2) Metal tags

   3) Grid marking system

   4) Sketch map

   5) Photography

b. Flame length

1) Referenced observations

2) Photography

c. Burn pattern. If the prescribed fire objectives include a requirement for a specific burn pattern or mosaic, the pattern of burn that is being obtained should be noted and communicated throughout the ignition phase.

d. Potential control problems. The occurrence of any of the following should be noted, and the Burn Boss notified.

1) Spotting

2) Torching or crowning

3) Fire whirls

4) Fire behavior exceeding prescribed limits

3. Smoke: Smoke can be monitored by using visual estimation. Aircraft can be used to track plume height and direction. Smoke monitoring is discussed in more detail in the NWCG Fire Effects Guide, Chapter IV.D.

a. Plume height and direction

b. Dispersion

c. Impacts on identified sensitive receptors

d. Personnel exposure

e. Presence of residual smoke after the ignition phase

f. Presence of smoke on highways

Postburn

Postburn monitoring activities include both observations and measurement. The major effort will be that required to determine whether fire treatment objectives have been met. Postburn data should be collected at the same locations where data were obtained before the fire. An assessment must be conducted to determine whether sensitive features have been protected and other constraints met. Data collection specifically involves measurement of preburn plots or data points and other estimates required to determine whether fire treatment objectives have been

attained. Prescribed fire funds can be used to pay for monitoring data collection for one year from the time of ignition.

1. Photo points and photo plots: While photo points may not be documenting a specific treatment objective, it is important to retake the photos soon after the fire so the impact of the fire upon the landscape, and upon specific plants, is documented. Photos must be taken with the same camera orientation as photos taken before the fire, preferably using the same camera, lens and film used for preburn photos.

2. Smoke: Any smoke data recorded by instruments during the fire must be collected. Some estimation of smoke production must be made. The most accurate estimates are based on fuel and duff consumption data, using the model CONSUME[012]. CONSUME Version 3.0, with national applications for wildland fire, is being developed. Consumption estimates for rangeland fuels can be based on recent photo series (see Ottmar and others, page 6-3).

3. Woody fuel consumption: If a quantitative fuel reduction objective was set, and fuel inventory was performed before the fire, that same inventory must be conducted after the fire.

4. Litter/duff consumption: Measurements of litter and duff depth taken before the fire should be repeated at the same locations as for the preburn inventory. Each depth of burn pin or bridge spike is measured to determine the amount of organic matter consumed at that site.

5. Soil heating: Any probes, electronic devices or temperature-sensitive markers should be relocated and read in the field. If-temperature sensitive paint templates or chips are to be collected and read elsewhere, each temperature-sensing device must be marked with its location during the sampling period.

6. Measures of plant mortality and injury:

a. Tagged plants. All tagged plants must be remeasured.

b. Plant density. Any plot data required to assess postburn plant survival or mortality, such as density measurements, must be collected again.

c. Tree injury. Severity of burning of conifers has been related to postburn survival, with different species able to survive different amounts of damage. Crown scorch height and stem char height can be related to flame length, and correlated with the fire prescription. If tree mortality is a goal or constraint for a prescribed fire treatment, fire treatment objectives that define injury are desired.

1) Crown scorch height. A tree crown is scorched if foliage is heated to a temperature that is lethal, but not high enough to cause its consumption. If scorch height is a fire treatment objective, it can be estimated for the stand or for individual tagged trees. Scorched foliage may not be apparent for several weeks after the fire.

[0]12. Ottmar, Roger D.; Burns, Mary F.; Hall, Janet N.; Hanson, Aaron D. 1993. CONSUME users guide. Gen. Tech. Rep. PNWGTR304. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 17 p.

2) Percent of crown scorched. The percent of crown volume with scorched foliage is a better indicator of tree mortality than crown scorch height because it considers the amount of live crown remaining to sustain the tree. Postburn mortality will be closely related to percent of crown scorched for most short-needled conifers because scorched foliage generally indicates that buds and twigs are also dead. If percent of crown scorched is a fire treatment objective, the average percent of crown scorch should be estimated and recorded for different size classes of trees within the stand or on tagged trees.

3) Percent of crown consumed. Mortality of some species may not be well related to scorch, particularly ponderosa pine and western larch. Death of buds and twigs is generally only indicated by the complete consumption of foliage. If crown consumption is a fire treatment objective, estimate and record the average percent of crown consumption on different size classes of trees within the stand or on tagged trees.

4) Stem char. For thin-barked species such as aspen, cambium layers are usually dead beneath charred bark, and bark char can be an effective fire treatment objective that results in aspen regeneration. If such an objective is used, note the height of stem char and percent of the base of trees that are charred within the stand or on tagged trees.

7. Indicators of fire severity: Severity is the degree of ecological impact of a fire. Ways to estimate the severity of a fire on shrubs, bunchgrasses, and soils are described in Appendix 7. These indicators can be related to vegetative recovery and the fire prescription. Severity indicators are useful if the relationship between a certain fire prescription and postburn effects are not known.

8. Global Positioning System (GPS): According to policy, fire perimeters must be recorded using a GPS unit. Large, unburned areas within the fire perimeter can also be digitized to
obtain a better estimate of actual acres burned. Noting all plot locations with a GPS unit will make the much easier to relocate later. It is recommended that field offices with GIS systems enter the monitoring plot locations (UTMs) into the system. Annotating GIS plot locations with monitoring data can enhance later analysis and evaluation.

9. Burn pattern: The attainment of a specific pattern of burn, a mosaic of areas where the fire did or did not burn, is an objective of many prescribed fires. Pattern can be monitored by visual estimation, along transects, with photography or by remote sensing. Digital images can be classified and become part of a GIS or other database.

An oblique image taken from a high vantage point, a hill or a tree, can be measured to determine percent of area in each pattern class. A low-elevation aerial image will provide the best piece of data from which to extract this information for small burned units. For large fires, remotely sensed data may provide a source for burn pattern information.

Indicators of Fire Severity

Severity is the degree of ecological impact of a fire. These indicators can be related to vegetative recovery and to the fire prescription. Severity indicators are useful if the relationship between a

certain fire prescription and postburn effects are not known. Field Offices are encouraged to use these indicators in association with staked plants and to monitor postburn recovery to provide a means of evaluating the fire treatment.

Relationships can be developed between fire behavior and consumption of shrubs and bunchgrasses. However, there are no clear relationships between these fire characteristics and postburn sprouting. Postburn regeneration of these plants can be related to the amount of damage sustained by the aboveground part of the plant, because there is a relationship between heating and consumption of aboveground plant parts and mortality of buried regenerating buds. If this damage is monitored and related to their postburn sprouting, information is then available that can be used to develop a link from the fire prescription to plant damage to postburn sprouting. The ability to predict recovery of key species under different prescribed conditions will be significantly enhanced if these data are collected and used in the evaluation process. Damage classes related to the amount of fuel consumption can be noted for marked plants, and subsequent survival, growth and production related to them. These classes may also be estimated for data collection plots. The relationships between these classes and mortality will vary among species.

1. Shrubs. The amount of damage sustained by the aboveground portion of sprouting shrubs and small deciduous trees is related to the amount of sustained heating of roots, root crown, and other subsurface reproductive structures, and thus relates to postburn sprouting.

Sprouting can vary among species sustaining the same amount of damage because the location of regenerating buds varies by species. Blaisdell (1953)[13] used the following classes for estimating damage to shrubs.

a. Unburned

b. Leaves scorched or consumed

c. Smaller branches and twigs consumed

d. Most or all of trunk or shrub main stem consumed

This information may be particularly useful when obtained from tagged shrubs and later compared to their survival. These classes may also be estimated for data collection plots. It is not useful to assign these classes to non-sprouting shrub species because a shrub with a canopy heated to lethal temperature is dead.

2. Bunchgrasses. Bunchgrasses survive a fire if some of the dormant buds and/or meristems from which shoot growth occurs are not lethally heated. These growing points are located at different depths above, at or below the surface, depending on the species. Conrad and Poulton (1966)[14] related bunchgrass survival to specific damage classes.

[13] Blaisdell, James P. 1953. Ecological effects of planned burning of sagebrushgrass range on the Upper Snake River Plains. USDA Forest Service. Technical Bulletin No. 1075. Washington, D.C. 39 p.

[14] Conrad, C. Eugene; and Charles E. Poulton. 1966. Effect of a wildfire on Idaho fescue and bluebunch wheatgrass. Journal

a. Unburned

b. Plants partially burned, but not within two inches of the root crown

c. Plants severely burned, but with some unburned stubble less than two inches tall

d. Plants extremely burned; all unburned stubble less than two inches tall and mostly confined to an outer ring

e. Plants completely burned; no unburned material above the root crown

f. Plants burned both above and below the surface, belowground portions of the root crown are consumed

2. Litter/duff layers. Burn severity is a qualitative term that can be used to describe the pattern of burning in the surface and subsurface fuel layer.[15] Burn severity classes relate to different degrees of consumption of litter, duff and soil organic layers, which closely relate to survival of plant roots and other buried reproductive structures. Also called ground char[16], this downward heat pulse is not predicted by the fire behavior system and has no consistent relationship to fireline intensity. Burn severity relates closely to both fire effects on vegetation and soils and the moisture content of large-diameter woody fuels, duff and other soil organic layers. When conducting postburn monitoring, noting burn severity and associated effects provides information that can be used to link fire prescriptions to fire effects. An example of descriptive classes of severity follows.

a. Unburned

b. Scorched. Foliage is yellow litter and surface vegetation are barely burned or singed.

c. Low severity. Small diameter woody debris is consumed; some small twigs may remain. Leaf litter may be charred or consumed, and the surface of the duff may be charred. Original forms of surface materials, such as needle litter or lichens, may remain; essentially no soil heating occurs.

d. Moderate severity. Foliage, twigs, and the litter layer are consumed.

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[15] Viereck, L. A.; M. J. Foote; C. T. Dyrness; K. Van Cleve; D. Kane; and R. Siefert. 1979. Preliminary results of experimental fires in the black spruce type of interior Alaska. USDA Forest Service. Research Note PNW-332. Pacific Northwest Research Station. Portland, Oregon. 27 p.

[16] Ryan, Kevin C., and Nonan V. Noste. 1985. Evaluating prescribed burns. IN: Proceedings _ symposium and workshop on wilderness fire. USDA Forest Service. General Technical Report INT182. Intermountain Forest and Range Experiment Station. pp. 230238.

The duff layer, rotten wood and larger-diameter woody debris are partially consumed; logs may be deeply charred; shallow ash layer and burned roots and rhizomes are present. Some heating of mineral soil may occur if organic layer was thin.

e. High severity. Deep ash layer is present, all or most organic matter is removed; essentially all plant parts gone. Consumption of a large proportion or essentially all coarse woody debris and soil organic layers occurs. Soil heating may be significant where large-diameter fuels or duff layers have been consumed. The top layer of mineral soil may be changed in color; layer below may be blackened from charring of organic matter in the soil.

This severity classification can be modified or a new one developed for a site-specific situation. Consistency of use among sites and years is the important factor. Pictures and descriptions of each class should be placed in a project file for reference by individuals who were not involved in the original monitoring of the prescribed fire site.

	Preburn	During (the day of) the fire	Postburn
Fuel characteristics for prescribed fire development	x		
Fuels information for treatment objective	x		x
Moisture content of slowly drying fuels	x	x	
Climatology	x		
Weather observations		x	
Spot weather forecast		x	
Photo points	x	x	x
Photo plots	x		x
Set up monitoring equipment	x	x	
Monitor fire behavior and characteristics		x	
Smoke production		x	
Read installed instrumentation for smoke			x
Read instrumentation for temperature			x
Determine if mortality objectives were met			x
Determine if plant injury objectives or constraints were met			x
Determine if fuel consumption objectives were met			x
Determine fire mosaic		x	x
GPS plot locations	x		
GPS burned area			x